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NEWS IN BRIEF

IBM pays 10% bonus

A BONUS of 10% a month on top of basic salary is being paid by IBM to all its 13,500 employees in the UK. The company said that this was allowable under the government's pay guidelines and that there would be no increase in costs or prices.

IBM added that productivity would increase by at least 10% over the next year because of orders already taken.

Honeywell offer

HONEYWELL has made an offer to buy all outstanding shares in semiconductor manufacturer, Siliconix, according to unconfirmed reports from the US. Honeywell is a large user of field effect transistors, a major share of Siliconix' business, and the move is said to be part of a Honeywell plan to increase its semiconductor capability.

UK expertise

BRITISH software expertise from Systems Designers Ltd is being used by Swiss engineering group Brown Boveri for a prototype railway control system. It is based on three Digital Equipment PDP-11s operating in triplex mode using the "majority voter" technique.

Bombed

AN armed terrorist group in Italy has bombed 10 computer installations during the last year, leaving a note each time claiming that "Computers are instruments of the capitalistic systems."

Police messages

FIFTY police headquarters are to be equipped with Transdata Model 252 Auto Send Units to overcome a communications problem.

Operations restored in record time after boiler explosion

AT 2am on August 9 an 8ft-high boiler exploded beneath Bowater-Scott's computer suite at Northfleet, Kent. The boiler, weighing more than a ton, was driven through the boiler-room ceiling, up through the data preparation room, through the concrete roof and into the night sky before falling back through the roof of an office 20 feet away.

When the dust cleared two dazed computer operators found that the company's ICL 2903 and all the data preparation terminals had disappeared through the 20ft-square hole made in the floor by the explosion.

They also found that the 1903A they had been operating in the next room was unrecognisable beneath a layer of dust and water sludge.

The explosion, thought to be due to the malfunction of control equipment, was remarkable in itself, but what has really impressed the company is that in a record time of just two weeks and a day another computer suite was prepared and a new configuration brought into operation.

And with help from ICL and other users, the company lost only one day's processing.

"By the following day, with ICL's help, we had identified two ICL computers which could process our work," said Brian Buchanan, Bowater-Scott's management services manager. Those two machines were a 1903T run by ICL's software subsidiary Dataskil in Reading and a 1904A run by the Co-operative Society at Godalming, Surrey.

Two teams went to these sites to run the invoicing system.

"The day after that we found a user in Eastbourne who had enough spare capacity to handle all our work, and the same day we began running our programs there. Six of our operators moved into a local hotel and, to minimise delays, we used a helicopter to take out data. We have continued on the same basis until now."

Fortunately Bowater-Scott had back-up discs and tapes stored away from the computer site.

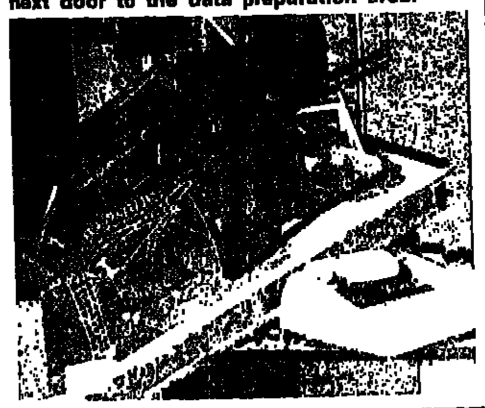
Bowater-Scott makes a wide variety of well-known toilet tissues and hand towels including Scotties, Andrex and Handy Andies. Its computer systems handle order processing, invoicing and delivery scheduling.

Once the alternative processing arrangements had been settled the company got on with preparing a new computer suite.

"We had no accommodation and no equipment and we were faced with a daunting task which would normally take nine to 12 months," said Buchanan.

The 2903 was written off — "we didn't find it for four days," said Buchanan — but the 1903A processor, a printer and some disc and tape drives were recovered and are now back in use. A 1901T has replaced the 2903.

ABOVE: The launching pad for a one-and-a-quarter-ton boiler. Bowater-Scott's boiler room is at the bottom of the picture and what is left of the data preparation area is at the top. BELOW: The 1903A computer room, next door to the data preparation area.



Amdahl boosts top team

TO strengthen its management team and develop marketing policy, Amdahl has appointed two new top executives, and Eugene White, president since 1974, becomes deputy chairman.

The newcomers are Jack Lewis, formerly group president of Xerox Business Systems who replaces White as president, and Brian Connell, who comes from IBM, will be senior vice-president responsible for corporate marketing.

Giving details of the changes White said that they had been made to take advantage of the "unusual opportunities over the next few years... to meet the extraordinary demand for our products." In his new post White will be concentrating on strategic planning.

Eugene White ... "extraordinary demand for our products."

Lewis was with IBM's Service Bureau Corp for 10 years before joining Xerox in 1970. He became president of Xerox Data Systems in 1974 and then president of Xerox Business Systems after Honeywell took over the Xerox customer base.

O'Connell is a long-serving IBM man having been with the company for 23 years. In 1971 he moved from sales to the Systems Development Division. For a time he was responsible for systems.

Marcol takes over JHDP

UK SYSTEMS house Marcol is to expand its business in the ICL software field by taking over J. Harwell Data Processing, the London-based specialist in ICL systems. The two companies have agreed in principle to the takeover and are now working on the final details.

The takeover is Marcol's first since the Norwich Union insurance group took a 25 per cent share in the company a year ago (CW, July 1, 1976). Marcol said at the time that it wanted to expand through takeovers. Since then it has set up Marcol Business Machines and Marcol Petroleum Services (CW, November 18, 1976).

For J. Harwell Data Processing, which has been in business for 13 years but has stayed small with only about 10 staff, the takeover ends four years of searching for a bigger group to service its products.

Managing director Jack Harwell said, "I am not a marketing man. I am very keen to get into a competent business environment. It will give us new opportunities."

Harwell added that his company could become a major software laboratory at Marcol. J. Harwell Data Processing's products include systems for converting 1900 programs to 2900 computers.

Marcol's most recent conversion contract is from BP Chemicals, which is transferring work at its Port Talbot plant in West Glamorgan from a 1904S to a 2970. More than 750 programs are being converted. Marcol is using the 2970 run by BOC's bureau subsidiary Datasolve at Sunbury-on-Thames for this work.

Takeover talks

THE unidentified company in takeover discussions with Applied Digital Data Systems (CW, August 26) is now thought to be Northern Telecom of Canada, the manufacturing and marketing arm of Bell Canada.

Coast-to-coast shares link

THE New York and Pacific Stock Exchanges are planning to implement a computer link which would enable stockbrokers at either exchange to compare bid and offer prices of shares on the East and West coasts, and take advantage of any slight price variations between the two exchanges. The Pacific Stock Exchange already has two trading floors, one in Los Angeles and one in San Francisco.

The Pacific Exchange currently does about 3½% of all business in stocks quoted on both exchanges, and it is thought that the computer link could increase this to at least 7%.

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Briefing

Changes at top in GA

TOP management changes are imminent at General Automation's UK subsidiary, based at Burgess Hill in Sussex, as part of a major shake-up of the US minimaker's European operations. The restructuring is in an effort to improve General Automation's performance in the European market.

Figures from International Data Corp show that GA does only 22% of its business outside the US, less than any of the other six leading US minimakers.

Not for teaching

"DIGITAL Computer Systems have no theory and are therefore not an appropriate subject for teaching in university", according to acerbic industry commentator Edsger Dijkstra. He ventured the opinion at this year's Newcastle seminar on the teaching of computer science in response to Iann Barron's paper on the impact of the micro on society. There is a full report on the seminar on page 17, and Djikstra also features on pages 2 and 18.

Memorex is back

AFTER four years in the wilderness the shares of Memorex Corp, disc, tape and semiconductor storage systems manufacturer, have been relisted on the New York Stock Exchange. Memorex lost its NYSE listing in July, 1973, when it ran into severe financial difficulties following an attempt to compete with IBM with the MRX 40 mainframe. It is only the second company to regain its listing in 20 years.

Potter charged

FOUNDER and chairman of Potter Instrument Co, John T. Potter, is being charged in the Federal Bankruptcy Court in Westbury, New York, with embezzling, misappropriating funds, intimidating employees and making threats to "ruin" the company. The charges are being brought by two Potter directors. Mr Potter is fighting for control of the company (CWI, September 8).

Honeywell bid

IT has now been confirmed that Honeywell has made a $10 per share bid for semiconductor manufacturer Siliconix (CW, September 8). The Siliconix board has yet to meet to decide on the bid and, although no competitive bids are being actively sought, a company spokesman commented that "it may not be the final one."

Food and drink aim

A NEW electronic sales register aimed specifically at the food and drink industry has been introduced by NCR. Called the NCR 250-5000, it is fully programmable, has a 16K memory and a three-station printer. It can hold 118 pre-set prices, 102 price look-ups and 32 waiter totals, and is priced at about £4,200.

Mavis—a match for any handicap

Julia Howlett and her guide dog Beulah come to terms with Mavis.

A MICRO-BASED system developed by a team at the National Physical Laboratory, Teddington, which enables the handicapped to communicate and interact with their environment, was put on show to organisations for the handicapped last week.

Nicknamed Mavis — an acronym for Microprocessor-based Audio Visual Information System — it is the first system of its kind and took the team, under project leader Dick Penn, 18 months to develop.

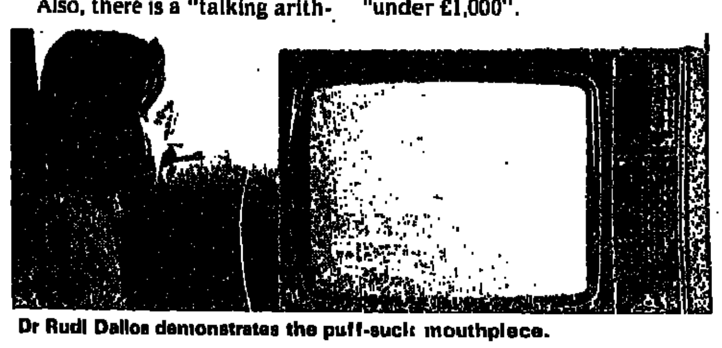
Based on a Motorola 6800, Mavis features a colour television as the display. This is for economy and because they are already in widespread use.

"It is the embryo of what things will become," said Dr Chris Evans, head of the man/computer interaction group at NPL. "Mavis is extremely flexible and can be tailored to almost any handicap."

For those with severe handicaps the puff-suck tube shown below by Dr Rudi Dallos, psychologist of the team, can be used. By the correct combination of breaths a cursor can be made to select characters from a matrix and "write" them on the screen as if by a keyboard.

Also, there is a "talking arithmetic program" (pictured left with Julia Howlett, her guide dog, and Tim Folkard) which does elementary sums, and a music program which allows simple tunes to be constructed and played.

Mavis presently handles Teletext broadcasts, but will eventually accept Viewdata as well. Cost of the final system will be "under £1,000".



Dr Rudi Dallos demonstrates the puff-suck mouthpiece.

Insac names top three executives

THE top three executives for Insac, the National Enterprise Board's computer services company, have been announced.

John Pearce leaves his job as NEB deputy divisional director of computers and electronics to become full-time managing director of Insac Ltd, although he will still be associated with NEB work over the next few months to complete negotiations with companies interested in joining Insac.

Tony Chandor, formerly group director at the National Computing Centre, becomes Insac's director of business development responsible for all new business ventures outside the US.

And, as expected (CW, August 18), Seymour Joffe is to head Insac's US operations as president of Insac Inc, which will be formally established in the next few months.

Pearce, who was the prime instigator of the Insac concept, said that the appointments put Insac into "operational mode".

By the end of the year, he hopes to have established Insac in new offices outside NEB premises. Although further appointments are likely to follow, Pearce said that his objective was to have a "small, highly powered company that is subtle enough to respond to opportunities as and when they occur".

At present two companies are members of Insac: CAP and Systime. Negotiations with SPL are still proceeding and talks with other companies are under way.

The prime objective of Insac is to enlarge the UK's share of international markets.

Growth of PO monopoly fears

THE Post Office monopoly on equipment for data transmission over the public switched telephone network is shortly to be extended to cover transmission at 4800 bps with the long-delayed announcement of a Datel 4800 service.

Fears about the effects of the growing Post Office monopoly have been highlighted by a strike of Post Office engineers who are refusing to connect privately acquired modems to leased lines.

Three years ago, the Post Office placed a development contract with Plessey for a new 4800 bps modem, and at that time hoped to start the service in mid-1975 (CW, February 7, 1974).

Once the new modems become available, existing suppliers of 4800 bps modems will be able to continue supplying them until their present licences run out, but those licences are unlikely to be renewed.

Private suppliers will also continue to be licensed to offer devices which offer clearly-defined facilities which the Post Office modems do not provide.

Datel 4800 will give alternate two-synchronous transmission over the public network or simultaneous transmission over four-wire leased circuits.

Although users are reluctant to be quoted, there is some disquiet about this forthcoming extension of the Post Office monopoly. Fears include concern that the modems provided will not be adequate to offer a reliable nationwide data service on the public network, worries about the effect of possible union action and disquiet about where the whole Post Office monopoly may lead.

Some users of the Datel 2400 service are dissatisfied with the performance of the Post Office modem under degraded line conditions, and fear that once the new modem is ready it will be similarly inadequate at 4800 baud.

Trouble at present occurs

● Turn to page 48

Othello finalist goes to Tokyo

DAVID FINAN, an operations shift leader for Northern Gas, was beaten into second place in the final of the British Othello Championship last Sunday. The winner, who gets a place in the world championship in Tokyo, was Joseph Woch, a representative for a pharmaceutical firm.

● Computer Weekly readers can now take advantage of a special offer and buy the game for £3.50, saving 75p on the recommended retail price. See page 6.

COMPUTER WEEKLY'S INSIDE NEWS

Dijkstra and the micro debate

At IFIP last month, Professor Edsger Dijkstra attacked the micro. On August 25, Computerview criticised Professor Dijkstra, saying that he had "articulated the voice of reaction."

This week, the columns of Computer Weekly are alive to the sound of the continuing micro debate.

Two readers write in defence of Dijkstra (page 18), the micro comes under fire at a conference at Newcastle University (page 17), and Computerview calls for a continuing constructive public discussion on the nature and role of the micro.

The cryptic factor

The transmission of sensitive data over communications lines places great importance on the development of adequate data security techniques. And this is where cryptography will play an important role, argues Donald Davies of the National Physical Laboratory.

Page 4

Softly, softly.....

Software is the key to successful systems implementations. It is also the most costly element in any system. These are indisputable facts of the soft life. In our special supplement on software and systems houses, we take a look at some of the variety of software choices facing the user

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COMPUTERVIEW

Dijkstra and the need for constructive criticism

THE microprocessor and Computerview have come under attack this week.

At a seminar on computer design at Newcastle University a number of voices were raised warning against a headlong rush into micros (page 19). And Computerview's recent criticism of Professor Edsger Dijkstra for his IFIP condemnation of micros has itself been taken to task by two readers (see Letters, page 18).

It is therefore worth re-stating some of the issues raised in the Computerview which was headed "Dijkstra articulates the voice of reaction" (CW, August 25).

In his IFIP speech in Toronto last month, Professor Dijkstra had made an all-round assault on the micro, claiming, among other things, that the micro was a "great leap backwards of 25 years" in software terms; that the hardware design was unreliable; and that the obsession with the low cost of the micro indicated that money had become the "currency of thought."

Professor Dijkstra's speech provoked violently contradictory love/hate reactions in Toronto. Computerview criticised those who supported the anti-micro view on what it called "blinkered and reactionary" lines that could only be justified as "a last ditch attempt at self-preservation for a species that feels threatened with extinction — the traditional DP profession."

Now it seems that there are some people who believe that Computerview has let the DP profession down by defending the micro and attacking a leading and respected figure in the computer world.

That part of the argument is best judged by our readers. But Computerview believes that the issues raised by Professor Dijkstra and the subsequent arguments are of such fundamental importance to the future of the computer profession that they need to be followed up in an open and *constructive* debate, with the emphasis on constructive.

The main reason why Computerview — and many delegates at IFIP — objected to Professor Dijkstra's speech was not because it criticised the micro, but because it did so in such an all-embracing, destructive way.

Consultant Iann Barron, who chaired the session at which Professor Dijkstra spoke, tried to steer that session to looking at how micro architectures should be improved to meet future needs. Barron had declared himself as a "micro convert" but stressed that he believed there were still many architectural problems to be sorted out in order to produce a more effective microcomputer.

At the same time, like many other informed observers, Barron recognised that the micro is an important and fundamental contribution to the growing information technology revolution into which computer, communications and micro technologies are rapidly converging.

To say, as Professor Dijkstra did, that the micro is a bad thing may be a good flashpoint for starting more public discussion, but it is not particularly helpful.

To the systems designer, the IBM 360/370 ranges are by no means the best designed systems on the market. Yet, despite their inadequacies, they are the most successful mainframe systems and are being put to practical use all over the world. Arguing that current micro architectures are bad, therefore, does not necessarily mean that they will not be — and are not already being — put to a multitude of successful uses.

And justifiable warnings, such as those raised in Newcastle last week, that micros could cause the re-inventing of the software wheel are not a reason for throwing out the micro with the software bathwater.

After all, it is not long since the Cassandras were crying against the mini for precisely the same software reasons that are now being raised against the micro: a reversion to bit twiddling assemblers and the unleashing of the software cowboys riding the new beast.

In all the criticisms of micros — poor architectural design, software naivety, reliability problems, etc — there is a great deal of truth, a great deal of research to be done, a great deal of debate, discussion and creation.

The micro, however, should be viewed as a challenge, not a threat; as a way of bringing computer power closer to more people, breaking down many of the barriers between the computer profession and the outside world.

The professional programmer should regard the advent of the so called home-brew amateurs as a stimulus to improving their own work.

In Computer Weekly's report on IFIP, we highlighted what we thought were contradictory statements — one by Professor Dijkstra saying that he is appalled by the standards of the hobbyist programmers, and the other by Paul Baran, who believes that the amateur writes better programs than the average commercial programmer.

But, as Dr. A. N. Walker of Nottingham University pointed out last week, there need not be a contradiction between those two statements. A comment like that should sting commercial programmers into trying to prove beyond a question of a doubt that people paid to program are professionals in more ways than just their pay packets.

And the DP manager must not look at the micro as playing into the hands of anarchic user departments but as an opportunity to extend the influence of the DP department into becoming a key element in the co-ordination of all information resources of a company.

As the dust settles after Dijkstra's furore, Computer Weekly will be following up the important issues that lie at the root of the micro debate by providing a platform for discussion and a forum in which the problems can be analysed rationally and the potential revealed.

Ten years ago...

COMPUTER WEEKLY SEPTEMBER 14, 1967

FORTRAN and Algol compilers which could be used on a 1900 were produced by ICT. The compilers were read into store in successive overlays... An ICT 1906E system was ordered by the London Clearing Bankers for their Inter-Bank Computer Bureau . . . The inaugural meeting of the Institution of Computer Science was held . . . Aircraft identification systems developed by Elliott's were ordered by the Nato Air Defence Ground Environment, NADGE... [illegible] Paris produced an accounting machine, the Logabax [illegible] with instant availability of [illegible] programs at the touch of a button . . . Sir Leon [illegible], Elliott's chairman and managing director, became deputy chairman and a director of English-Electric, following E-E's successful bid for Elliott's share capital.

Installation closes down

COMMERCIAL vehicle manufacturer Seddon Atkinson, subsidiary of International Harvester (GB), has closed down ICL 1902A installation [illegible] ham following a decision to transfer processing to a [illegible] well 66/40 at the International Harvester complex.

Completion of the switch is expected within eight [illegible] and during this period Seddon Atkinson data is being processed on an ICL configuration [illegible] Hoskyns Systems centre Manchester.

INTERRUPT...

IN a time long gone, a computer engineer was installing a disc. It was the days when discs were like giant machines from the engine room of an old Queen liner. Just as the engineer was putting the finishing touches to the tuning of the disc's 360 read/write heads, the computer room door opened and a voice said, "Like a cup of tea, mate?"

It was the nightwatchman being friendly.

As they chatted over tea, the curious watchman asked how the computer was powered.

By electricity, said the engineer.

But, as the installation was for a gas board, the watchman asked why it couldn't be powered by gas.

In order to explain, the engineer, with the watchman's agreement, made several trips to his car via an open window to get the necessary explanatory documentation.

The tutorial was suddenly interrupted by a "Hello, hello, what do we have here" policeman, come to investigate the strange goings in and out of the window.

All was explained and the three men continued tea and enjoying the pleasant company, when suddenly thirty (sic) policemen burst in, truncheons at the ready.

The investigating constable had failed to report back to headquarters within 20 minutes and the lads in blue had feared the worst.

The moral of this story is: Engineer who gases too much can burn out good customer relations.

● *Submitted by P. W. Birch, Harrogate, Yorkshire:*

Interrupt entries should be sent to the Editor, Computer Weekly, Dorset House, Stamford Street, London SE1 9LU. For published entries £5 will be paid.

FOCUS on the obsolescent DPM

DESPITE suggestions to the contrary, the DPM is very much alive and kicking. In fact the object of his kicks could well be those industry communicators who have been forecasting his demise for some time.

By now the DPM should be very much in the obsolescent mode, labelled and tagged a product of a previous generation. While perhaps members of the DP team are enjoying the delights of the London Laserium, a replica DPM should adorn the adjacent waxworks. Or maybe, redundant groups should be collated, batched and dispatched to an off-site storage depot.

This is not, of course, the first time that the communicators have got their forecasts wrong. For some time now they have been making highly supercilious comments about the future of punch cards. Mis-reading them, I suppose. Punching is still very much a viable activity. Similarly questioned is the practical operation of pre-2900 and 3700 machines.

In the case of the harassed DPM, evidence for his retention is not difficult to find. The Data Processing Management Association — the DP managers' trade association — reports an upsurge of interest, by no means limited to advice on redundancy pay, while the latest edition of the Computer Users Year Book lists a bumper bundle of installation managers. The average DPM is probably even more resilient than his equipment. Techniques come and go, installations may well unbundle, but the DPM is as near-indestructible as the floppy disc.

This fact of computer life is the cause of much anguish to interested parties. The DPM, however, has long been conditioned to resisting raiding

The DPM's good cause is not exactly helped by recent informed comment. Tom Gilb has suggested, for example, that DP managers who are not as qualified as certain members of their operating teams should take the hint and move over; either that or master the latest tools and techniques of the DP trade. It does, however, seem to many DPMs that the days when hands-on knowledge was an essential part of their craft are long departed. Hands now are more likely to be writing reports or organising projects than manipulating sundry tape drives.

Apart from the insurance aspect of a possible future career alternative, should redundancy strike, the driving force [illegible] computer managers' lives [illegible] establish their role in the [illegible] pany's information str[illegible] Information processing [illegible] much in the growth [illegible] Companies are becoming aware of the need to [illegible] well defined data information channels. No self-respecting organisation can afford [illegible] up-to-date situation [illegible] from the sales rep in the [illegible] on-site stock movements [illegible] the warehouse.

This is one role the [illegible] well qualified to perform [illegible] else is better placed to [illegible] at company level the [illegible] merits of a basic tab [illegible] full scale telecommunications network?

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Teletext TV makers in talks on low-cost printer

DISCUSSIONS are being held with teletext TV manufacturers, including GEC, ITT and Rank, for the incorporation of a low-cost printer that will involve only about £100 in the total cost of the terminal.

The 2,200 chps printer, called the model 1100, is also being evaluated by ICL for its 7500 series VDU terminals and could prove attractive to computer hobbyists and micro users.

Built in the US by SCI Systems, the Model 1100 is now being sold in the UK by Peripheral Hardware of Camberley, Surrey.

A Peripheral Hardware spokesman said that the Post Office has already seen the printer and considers it suitable for use by Viewdata customers. Peripheral Hardware is now hoping to win approval from the IBA and the BBC which run Oracle and Ceefax.

In a teletext receiver the 1100 would be inserted into the grid of the VDU so that no buffering would be required and the printer could be used in its simplest form — the printer mechanism and a driver card.

Peripheral Hardware quotes a one-off price of £228 for this, but stresses that the price would be dramatically reduced for bulk orders from TV manufacturers.

As a stand-alone printer with serial and parallel interfaces and a RAM buffer, the 1100 costs £745.

Peripheral Hardware sees the 1100 as a rival to printers like the Texas Instruments' Silent 700 and the Teletype 33, and claims it has a superior cost/performance — about 25 cents per character per second compared *to about $80 for the Teletype 33.* However, the 1100 can print only one copy at a time.

The 1100 was shown at Compec Europe earlier this year by a Continental distributor, Teleprint Benelux (CW, May 19).

It uses four-inch-wide electro-sensitive paper which passes axially over the edge of a rotating disc. This is fitted with a five wire stylus print head that creates 5 x 7 dot matrix characters by vaporising dots on the aluminium surface layer of the paper to expose the under-coating.

In this way data is printed in columns rather than lines, with up to 24 characters per column. This means that the number of lines per page is limited to 24, but the line length can vary as required.

Peripheral Hardware says that the 2200 chps speed of the 1100 enables it to be connected to the 8-bit DMA bus in a microprocessor configuration. The standard 1100 prints 64 ASCII characters, but 96 characters *are available as an option* using a head that generates a 7 x 9 matrix.

SCI Systems is an established specialist supplier of computer memories to the US aerospace industry and employs 1,000 people. It developed the 1100 as part of a move into the banking market.

Ex-Scicon boss' 70th birthday

Gennaro's restaurant in London was the scene last week of a night of nostalgia, good humour and well known stars in the UK computer firmament when the former managing director and chairman of Scicon, Sir Maurice Kendall, celebrated his 70th birthday.

Sir Maurice became managing director of CEIR Ltd in 1962 and in 1967 took on the role of chairman. A year later, after links between the UK operation of CEIR and its American parent had been severed, Scicon came into existence, with Sir Maurice still as chairman.

A former president of the Royal Statistical Society and former vice-president of the Market Research Society, Sir Maurice was elected as a Fellow of the Royal Society of Arts in 1971.

Although he resigned from Scicon in 1972, Sir Maurice has by no means gone into any kind of inactive retirement and he is current director of the World Fertility Survey.

The success of Scicon under Sir Maurice's managership was best illustrated by the distinguished Scicon alumni at the dinner, including Logica's managing director Len Taylor; Doug Eyeions, a director of external relations for BOC Datasolve; Don Wilson, an SPL director; Steve Feldman, formerly a Logica director and now at Data Logic; plus many others who have moved on from Scicon to make significant contributions to the British computer scene.

At the same time, many of the "old timers" as they called themselves, have continued with Scicon.

In our photograph, Sir Maurice (seated) is seen receiving a silver cigarette box from John Ockenden, managing director of Scicon Consultancy, as a token of appreciation from those who owed so much to his guiding hand.

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BCS turns loss into a £6,500 profit

THE British Computer Society has turned its £34,570 operating loss of 1975-76 into an operating profit of almost £6,500 this year. And with £200,000 coming as the first part of its new £300,000 deal with Haymarket Publishing (CW, June 23), the society passed £233,200 to its accumulated fund, compared with only £14,000 in 1975-76.

Subscriptions from the 22,000 members brought in £292,230, and income from services such as education and publications was £70,700. These services cost the BCS £140,500, however, and items such as salaries, rent and computer time took the total expenditure to almost £234,000.

This year the BCS has budgeted £400,000 for a new HQ building, so it expects to make a loss of £257,000. In the following year the profit is expected to be about £29,000.

First conference

GOVERNMENT officials responsible for university computing in six European countries met at Bath University earlier this week at the first Conference of European Computer Boards.

The conference, which discussed matters of common interest and looked at possibilities of international university collaboration, was the first of what is hoped will become a regular event involving more countries.

The countries taking part were Austria, Belgium, Denmark, West Germany, Holland and the UK. Christopher Layton, head of the EEC's science and technology directorate, was also present.

Topics discussed included ways of assessing demand for computing facilities; networks; charging for university computing services and coping with the effects of inflation on costs. The UK Computer Board's budget has been particularly hard hit by inflation and by government spending cuts.

Dr Henry Norton, secretary of the UK board, said future meetings could be extended to include, for example, directors of computer centres who could discuss areas of possible collaboration such as software.

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PRIME

DOWNTIME
by Chad

Pregnant pause in his career

A 24-YEAR-OLD American almost made medical history because of a refusal by people to translate a computer coding into real terms.

Following his medical for a job, Gene Durham, a Dallas construction worker, was offered a job with the Lindell Company in Chicago, but two days before he was to join it, he received a letter terminating the offer. He had failed his physical because of the R-3 clause in his prospective contract, it said.

R-3 clause?

"I was being turned down because of pregnancy," said Durham.

Taking the whole thing philosophically, he telephoned the Lindell Company personnel office expecting "a big laugh."

But when the woman checked his file, she said that he had been given an R-3 rating and that he should talk to the clinic where he was examined.

"The woman there said I had a definite R-3 rating," he said. "That's all she could tell me over the phone."

Durham then flew to Chicago to sort things out, but was told by the Lindell personnel department that rules were rules, and that was that. Unless notification of a mistake was received, he was still R-3.

"They just checked the computer," said a presumably less philosophical Durham, "all they talked about was the R-3 ratings. No one seemed to want to translate it as meaning that a 24-year-old man was pregnant."

It took three weeks finally to sort out the mix-up. A doctor at the clinic found that a pregnant woman named Jean Durham (not *Gene* Durham) had been examined as well and it was her file that had been sent to the Lindell Company.

Mr Durham had his job offer reinstated, according to the Montreal Star, but his contract has a clause that forbids maternity benefits in his health insurance for the next nine months.

Just in case, I suppose. . . .

"Congratulations—you're fired!"

Hard and fast . . .

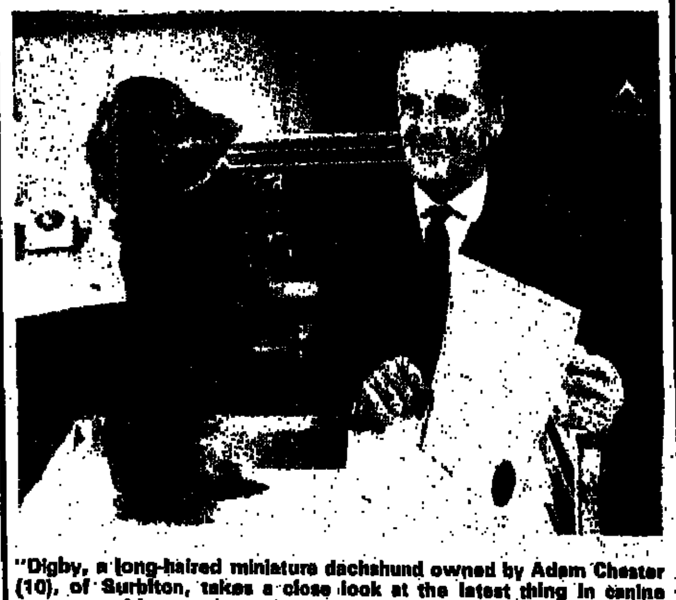
THE Isle of Man Grand Prix, run last week, used a computerised timekeeping and lap-marking system for the first time. Supplied by Univac, it was based on two U200 information terminals linked to the Manx Government's 90/30.

Software comprised the standard Univac IMS 90 (information management system) package, integrated with what is described as "an action programme written by the Manx Government" — Whitehall, please note.

Results were obtained in seconds rather than the minutes previously needed. One terminal was sited in the Timekeeper's box, together with a printer to give immediate hard copy of results displayed on the information terminal's visual data screen, and the other was used in Manx Radio's commentary box.

Input of relevant data was via the Timekeeper's U200, and the other terminal was used to call up data as required.

Details available immediately from the system included type of race, rider number, machine type and lap time. Leader-boards for each lap were displayed, remaining on the screen automatically.



"Digby, a long-haired miniature dachshund owned by Adam Chester (10), of Surbiton, takes a close look at the latest thing in canine oneupmanship—a computer-printed pedigree certificate," said the caption with this picture. I took a close look, too, and was surprised to see Digby was studying the statistics of a female black and gold German Shepherd Dog. I await the outcome with interest. The idea for this application, called Checkmaster, came from Nick Waterhouse (also pictured), whose firm, System Aid of Southall, Middlesex, developed the system and sold it to the Royal Agricultural Society of New South Wales. The society now holds the records of half a million dogs on its 2903 system, each with four generations of family history. Next target, apparently, is Australia's cats — for System Aid, that is, not Digby.

The growing amount of sensitive data being transmitted is forcing increased attention on the need to make that data as secure as possible. As a consequence, the National Computing Centre is holding a seminar on data protection by cryptography in London on September 28.

As a foreword to that seminar, DONALD DAVIES, superintendent of the division of Computer Science at the National Physical Laboratory, here discusses a recent development which could change the whole nature of cryptography. In a further article, Mr Davies is to describe the new cryptosystem in detail, giving a simple example.

Breakthrough in cryptography—

BY the end of this decade data communication should be cheap and reliable. At least 12 European countries have announced plans for new data networks to be operating by the end of 1980, and these will be used for all kinds of formal transactions such as orders, bills, payments and for access to databanks, some holding sensitive information.

Already, high value payments are sent through private networks and the value of some commercial information is equally significant. Privacy legislation may in future require network users to safeguard data in transit as well as in storage.

To meet this requirement it is most likely that cryptography will grow in importance as a method of making data more secure on communication lines or when stored in a removable medium. Closely related to cryptography is the authentication of messages. A message carries with it information which makes it tamper-proof and shows that the message really did come from the alleged sender and has not been altered since.

The trick used in both cryptography and authentication is to have a secret key. The key is simply a number which is known only to the sender and receiver. In cryptography it ensures that only the authorised receiver can decipher the message. If a message has an authenticator attached to it, the use of the key enables its authenticity to be checked.

The security of these systems lies in having a large range of keys, in exactly the same way that the security of a lock depends on the number of ways the key can be made. If the number is too small, it becomes feasible to try all the keys and see which one fits.

Everyone can be expected to know how a lock works, and so too the mechanism of the cryptographic or authentication algorithm is not regarded as the most important thing to keep secret. The system ought to be secure even when everyone knows the algorithm.

On this basis, a US standard encryption algorithm for government use has recently been published. This will lead to the wider use of cryptography, because large-scale integrated devices are being manufactured for the US data encryption standard. These aspects of cryptography and its application in networks will be the subject of the NCC-organised seminar on data protection by cryptography.

"Breakthrough" is not a word that should be used lightly, particularly in a subject like cryptography where "unbreakable ciphers" have gone down like ninepins. Nevertheless there has been a recent breakthrough which, if it works well in a practical sense, can change the whole nature of cryptography.

It departs from the strongest tradition in cryptography, which is that the same key is used at both ends of the communication system. Transporting the key from one station to another is an expensive part of traditional cryptography and a possible weakness. The new scheme, which is called a public-key cryptosystem, uses two different keys and allows the key used for encryption to be made public. The idea was suggested in a paper by Diffie and Hellman in IEEE Transactions on Information Theory, entitled New Directions in Cryptography.

Figure 1 shows how the system works. The boxes in the figure represent mathematical functions which are parts of the publicly known encryption/decryption scheme. Anyone who wants to receive secret messages announces his public key. To do this, he chooses at random a starting key which he keeps secret and transforms this by known functions in two different ways into a public key and a secret key.

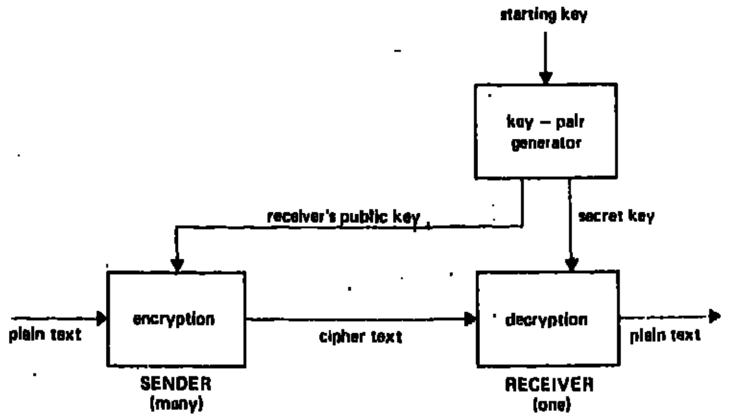


Figure 1. The public-key cryptosystem

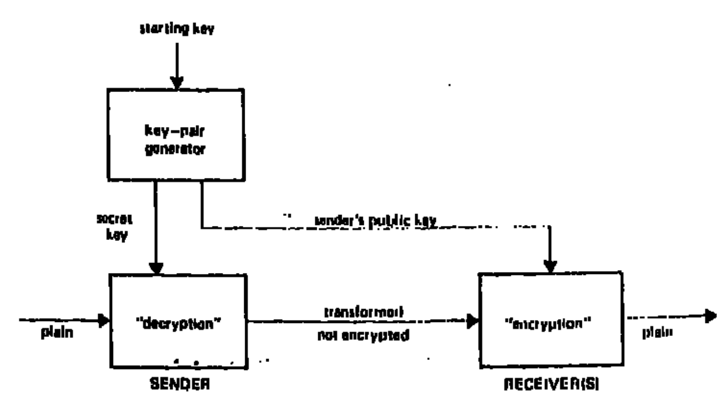


Figure 2. Message authentication by public-key system.

The intention is that the public key will be used as part of an encryption algorithm and the secret key will be used as part of a decryption algorithm. If a suitable mathematical trick can be found the decryption will be, as it should be, an exact inverse of the encryption function when a "matched" pair of keys is used.

The public key is known but the starting key (and hence the secret key) is nevertheless secure. This implies that the function by which the public key is generated is a "one-way function". This is the concept which Roger Needham of Cambridge University introduced for making the lists of logging-on numbers in a computer more secure. When someone logs on to a time sharing system the number he uses is transformed by a one-way function and this transformed number is compared with the stored values which are contained in a table covering all the authorised users.

It does not help the would-be fraudulent user of the time sharing system to know the transformed values in the table because the inverse of the one-way function, although it exists, cannot be calculated in any reasonable length of time. To construct such a one-way function you need a very discontinuous transformation and there are many possibilities, some using number-theoretic properties.

In making their suggestion, Diffie and Hellman put forward some mathematical tricks which made the idea seem plausible but they were not able, at that time, to demonstrate a workable system with enough security. Now such a system has, it seems, been found by people at Massachusetts Institute of Technology.

Diffie and Hellman proved that, if a public-key cryptosystem could be devised, it would have just as far-reaching an effect on the concept of authentication as it had on encryption. It was remarkable enough that the centuries-old need to transport a key by a trusted messenger to your correspondent might be removed. It was an added bonus that it gave a better kind of authentication, and this gave the search for a workable public key system an additional driving force.

The trouble with authentication is that both the sender and the receiver must know the key. This is satisfactory if they trust each other, but suppose that one of them suspects the other of fraud? A classic example would be one where the sender asks the receiver to buy some shares on his behalf, which the receiver does, but the deal turns out badly and the fraudulent sender denies that he sent the message and asserts that the receiver forged it. Since the receiver knew the authentication key he could have forged an "authenticated" message. It would be difficult to adjudicate in such a dispute unless all messages were constrained to go by a third party communication system which recorded them as evidence.

The public-key cryptosystem can be operated in reverse to provide the stronger form of authentication that is needed. Figure 2 shows how this is done. The function formerly used as encryption is applied to the plaintext and is inverted at the receiving end by what was formerly encryption. This reversal of roles will work quite well if the functions are 1 to 1.

Since the sender uses his secret key, it can be assumed that no-one else could have produced a message of exactly that form. Anyone who knows the public key can apply the transformation which reduces it to plaintext, so the message in transit is not a secret.

In the case of a dispute the receiver can take along to an arbitrator the message which he received and the public key which everyone knows and demonstrate that, put together, they make a plaintext. This implies that the message came from the holder of the corresponding secret key. The sender's only recourse would be to allege that the key was stolen and the law would, I suspect, expect him to take the consequences of being careless.

Authentication of this kind provides a sort of unforgeable signature which can be transmitted by a digital communication network. The way is therefore clear for transmitted documents to have legal status, though I wonder what the law will make of the theory that supports the announced public-key system.

It is not difficult to see that two transformations of the figures can be nested, using keys of the sender and the receiver so that the message on the line is both secret and authenticated.

The news of the working public-key cryptosystem appeared in the August issue of Scientific American in Martin Gardner's column. With it was a puzzle of 129 decimal digits, an encrypted message, and a non-secret authenticated message which, using the public algorithm, we are told gives a plaintext offering a prize for cryptanalysing the ciphertext.

● Turn to Page 11

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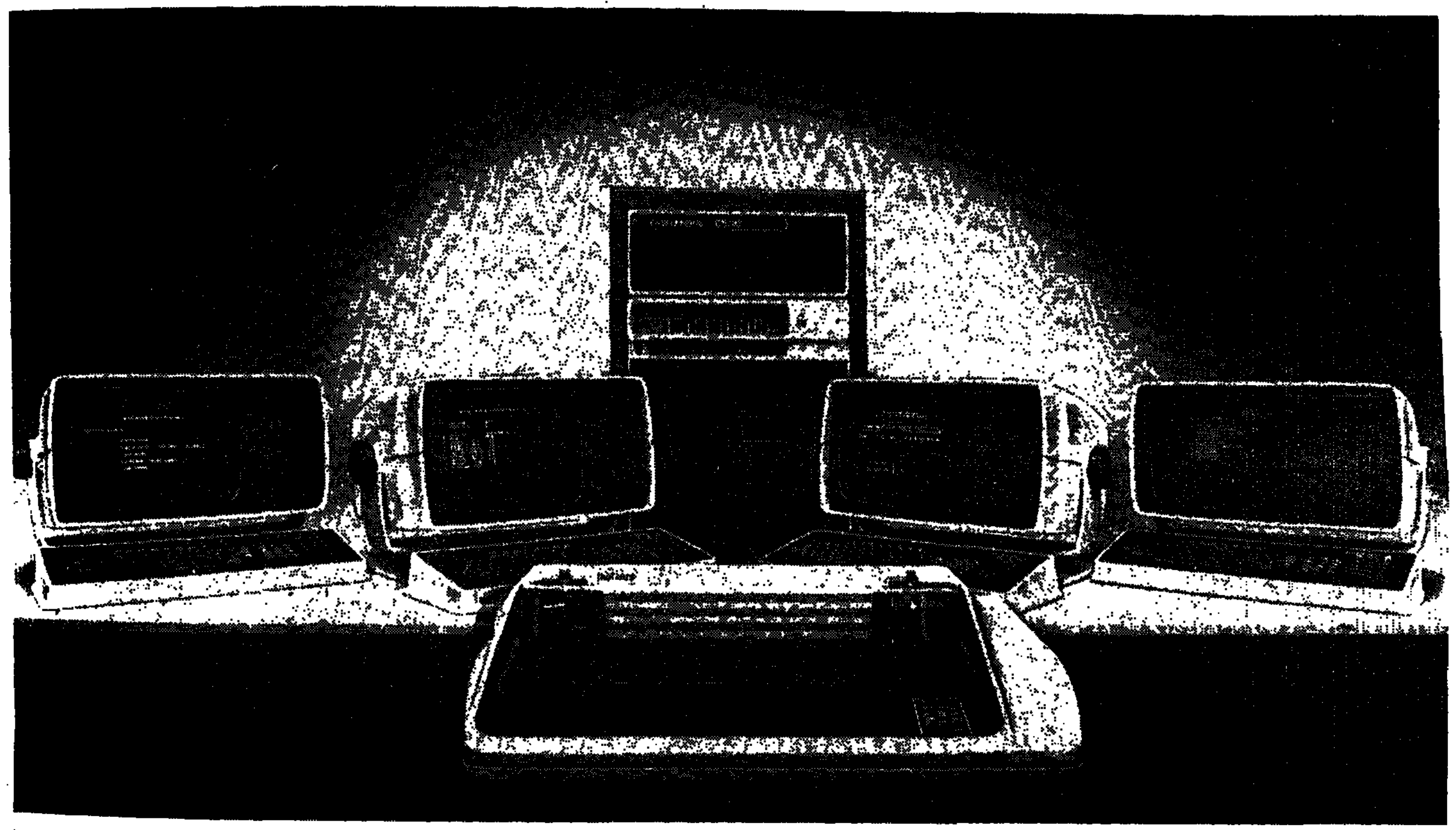

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SOFTWARE FILE

Fortran standard ballot complete

THE next two months could see the international acceptance of the new standard Fortran. Today (Thursday) the American National Standards Institute expects to complete a membership ballot on whether Fortran 77 should be adopted, and in November the International Standards Organisation's programming standards working group will discuss whether to accept or adapt the new standard.

Meanwhile the international Codasyl organisation has concluded three years' work by producing a document giving details of a Fortran database facility.

The Fortran committee was given permission to go ahead with the ballot at a meeting of the full ANSI committee in June. At the same meeting the ANSI committee accepted Codasyl's proposal to provide a database facility for Fortran.

Members of the ANSI Fortran committee will be at the International Standards Organisation meeting in November, and it is expected that people interested in Fortran in other countries will also be there and that proposals for international standardisation of some form will emerge.

The 1977 standard will supersede the 1966 standard, but already ANSI is talking about a new standard for 1982. One recommendation now with the Fortran committee is for a further revision to be made over the next five years. The revision has even been given the name of Fortran 82. The most notable innovations in Fortran 77 are the IF...THEN...ELSE and DO...WHILE...UNTIL statements.

The final Fortran 77 standard, X3J3/90, can be obtained for $15 from Robert Brown, CBEMA, Suite 1200, 1828 L Street NW, Washington DC 20038, USA. The Codasyl Fortran Database Facility Journal of Development is available for $4 from Material Data Management Centre, Department of Supply and Services, Ottawa, Ontario K1A 0S5, Canada.

DEC to sell Coral 66

THE real time language Coral 66 has been so successful in Europe for the US minicomputer manufacturer Digital Equipment that the company is to sell it worldwide as a standard product. DEC has set up Coral marketing and support functions at its main offices around the world.

The Coral compiler was developed two years ago for PDP-11 minicomputers by DEC's software engineering group, based in the UK (CW, August 28, 1975).

Earlier this year the company refused to comment on reports that it had Coral users on the Continent (CW, July 21), but it has now confirmed that Coral has been sold in Europe since March last year and that there are users in France, Italy, Norway, Switzerland, the Netherlands and the UK.

DEC reports great interest in Coral in the US. It expects the language to play an important role there in real time and process control systems in laboratories and in research and industrial applications.

BCS to host Algol meeting

A MEETING for software specialists is being organised by the British Computer Society's Algol Association and systems implementation languages group, next Thursday, September 22, at London's Birkbeck College.

The meeting, open to BCS members and non-members is to start at 10.30 am with Dr Mike Rees of Southampton University talking about Pascal. He will be followed by Dr Mike Falla of Software Sciences, who will describe the Gamma system implemntation package.

The third speaker is to be Dr Martin Thomas from London University, who will talk about the Algol 68 compiler on ICL's 2900 range of computers.

Further details can be had from Nick Bushby on 01-637 0552 or Brian Wichmann on 01-977 3222, extension 3970.

Puzzler

```
      x x x x x
    √xxxxxxxxx
x     xx
      --
        xx
  xx    xx
      ----
        xxxx
  xxx   xxxx
      ------
        xxxx
 xxxx   xxxx
      ------
        xxxxxx
 xxxxx  xxxxxx
      ------
```

DESPITE the fact that every single figure in this square root calculation has been replaced by an x, it is still possible to "restore" the sum by careful retrograde analysis. See page 47 for solution.

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MICHIE'S PRIVATEVIEW

Let's get away from the 'Star Wars' image

THE field of artificial intelligence has in the past had an outlandish image, part whizzkid, part Dr Strangelove. No one attending last month's International Joint Conference on Artificial Intelligence at MIT, Massachusetts, could come away with such an idea still in his head.

The signs are of patient and orderly progress. Gone are the romantic 1960s, when excitement could be generated by theological disputes between, say, a General Problem Solver approach (which didn't solve any real problems) and a Resolution Theorem Proving approach (which didn't prove any real theorems).

In place of this, but crucially indebted, be it said, to these early hopefuls, are programs in Woody Bledsoe's Texas laboratory which prove mathematically interesting theorems; programs such as those of Cordell Green's Stanford group which solve hard sorting problems and document the solution programs; programs which actually help medical experts, professional chemists, crystallographers and molecular geneticists; programs which beat chess experts across the board; and programs which chat agreeably in English with reasonable perceptiveness of the user's needs.

This last achievement, I predict, is on the verge of hitting the marketplace like a bomb. Larry Harris, of Dartmouth College (birthplace of Basic) described his Robot system, which has no relation to numerous other systems and artefacts of the same name.

This Robot is an English-language package which Harris interfaces with some ease to a range of standard database query systems.

Afterwards in his house in New Hampshire I had the enjoyment of interrogating test files of personnel and car-ownership data by remote dial-up to a Washington bureau. Appropriately, the name of the company responsible for the system is Artificial Intelligence Corp.

My own view is that the gathering wave of application, unless it is kept carefully in perspective, may harm the development of our infant science. As a member of a conference panel on "future directions" I saw a large audience, after a lively start, begin to yawn. I don't blame them. That stuff is all done better in "Star Wars." I would have preferred discussion of what kinds of systematic experimental science should be being planned to elucidate "intelligence," "learning" and "knowledge" in their computational aspect.

Should Morgan's great laboratory, engrossed in building the foundations of modern genetics through thousands of meticulous breeding experiments with fruit-flies, have been redirected to cows and chickens? What about Rutherford's team, with not even a prototype atomic pile to show? — yet they changed our whole concept of the fine structure of matter.

Clearly power-plant designs are idle without prior insight into the laws of the atomic nucleus. Likewise efforts to build really large knowledge systems — on the scale, say, of the quantity of chemical knowledge that a chemistry post-graduate student has assembled and indexed in his head — are doomed without a grasp of abstract principles of knowledge-acquisition.

The sheer tedious labour of formulating explicitly such huge bodies of knowledge and pumping them in by hand is prohibitive. For this reason it is worth watching studies of machine concept-formation, such as Michalski's AQVAL and others systems reported at this meeting.

Let us not underrate the importance of cognitive engineering in the sense of man — household robots, stenographic word-processors, stockmarket query systems, super-smart TV games, chess-playing machines, home tutors, air-traffic controllers, insightful marketing consultants to medical consultation systems, training, and the rest.

Science gains vitality from the rush to application. Somehow, somewhere, there should be groups enabled to think and experiment in a style which, time and time again, has won needed victories. Benzer using bacteriophage virus to map the genetic map in fine ground," Sherrington deciphering the integrative action of spinal reflexes, Luria setting up the basics of neuropsychology and Pavlov earlier doing the same for digestion.

Perhaps we need a science which does not succeed, though it came from a "Star Wars" — something with a profile and description consistent with AI's aims in computer science. Maybe, some people, myself included, will be comfortable with the "knowledge science," or possibly with "knowledge engineering" or "cognitive systems" in analogy with "operating systems").

One of the off-shoots of the conference was Ed Feigenbaum's proposal to set up a permanent international association for artificial intelligence (that plastic word again!). An ideal opportunity which I hope will be seized by the AI field to attest its maturity with a new name!

Donald Michie

● In the introductory Privateview (CW, August 25) details of Professor Michie's appointment to the chair of machine intelligence at Edinburgh University were inadvertently omitted. He took up the post in 1967.

'Clearing house' set up

A SOFTWARE company in Sevenoaks, Kent, has set itself up as a form of software clearing house so that systems written by users for their IBM System 32, System 34 or System 3 computers can be made widely available.

The company, EPG Computer Services, was formed last year by two IBM engineers. It has just produced its first catalogue of 16 application packages, utilities and documentation and debugging aids written by a System 3 user, two programmers and by EPG staff themselves. All but two of the systems cost £100 or less.

"The programmers who produced the documentation aids gave us the idea," said John Galloway, a partner in EPG. "There's a lot of people producing bits of software but if there's no clearing house they don't see the light of day.

The systems currently available include restart, job analysis and several file utilities analysis of the use of field and label names in a program; and programs which produce documentation on disc files, job control statements and report formats.

The application packages include a routine which produces a tape of direct debit transactions for input to bank computers; RPG mathematical subroutines; and a system which enables the user to select jobs from the spool queue and copy them to an output device.

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USER FORUM

A page for the hard-core technical viewpoint, edited by Chris Stevens, data processing consultant to John Lewis.

Report slams 'anti-customer' sales policy

Maurice Thorne: "We have made a lot of money on the 360."

WHEN you buy your next computer, chances are you will be buying just the hardware: you will not be able to buy the operating software or the programming language and utility programs.

This trend, pioneered by Burroughs on the B80 and followed by NCR with the 8250 and now IBM with System 34, is strenuously criticised by computer product analyst Management Information Corp in an otherwise favourable report* on the new IBM System 34.

The policy means that since the system is useless without the system software, the company which buys a System 34 can never own an operable system.

"Consequently," says MIC, "the purchaser must continue to pay a rental fee on a purchased system, and cannot sell the system unless IBM enters a licensing agreement with the buyer.

"We believe that such a practice will seriously affect the resale value of computer systems, or even preclude such resale by the users themselves. When the manufacturer licences the operating software, it controls the fate of your system.

"We consider this policy anti-customer and question its legality."

Turning to the hardware, MIC describes System 34 as a substantial small business computer product that is worthy of the name.

However, MIC emphasises the limitations pointed out by Computer Weekly, in particular that the limited maximum disc capacity of 27.1 Megabytes is still only offered on fixed disc, which means that the only way to dump the data on disc is to write it on to floppy discs, as with System 32.

MIC points out that to read an 8.8 Megabyte disc on to the standard 250K-byte floppy would need 35 discs and take about 25 minutes. The availability on the 34 of double-sided double-density floppies improves the situation, but it would still take eight floppies and eight minutes to do the same dump.

MIC notes that the System 34 processor consists of two microcomputers operating in parallel. The main microprocessor, with up to 64K-bytes of 600 nanosecond cycle MOS memory executes the instructions, and a minimum of 14K-bytes of memory is required for system software. The second micro has 16K-words of main memory and includes microcoded system functions and input-output control.

Although the System 34 is claimed to support a different program at each of the eight terminals or printers, MIC questions whether 64K-bytes will prove sufficient to allow a reasonable response time.

On pricing, MIC notes that in the US, System 34 costs about $200 a month more than an equivalent configuration of System 32, but has the capability to grow into a multiprogramming multiterminal system.

Overall, MIC rates the B80 from Burroughs a more cost-effective system, particularly since it starts at System 32 level and grows to something comparable with a fully-configured 34. From there the user can expand straight to the software-compatible B800 and B1800.

Against the Univac BC7, not yet announced in Europe, MIC says that System 34 is more sophisticated, but notes approvingly that Univac sells the BC7 system software with the hardware.

A point overlooked by MIC is that there is no power-fail protection on System 34, so the user would lose everything if there were a power cut or the plug was pulled out (CW, April 21).

* The report is published in Small Business Computer News, a monthly newsletter available for $51 a year from Management Information Corp, 140 Barclay Centre, Cherry Hill, NJ08034, US.

Success story of an unusual upgrade

Reader's Digest computer room. The 360/65 supports 16 tape drives and 12 disc units. The customer main file runs to 45 reels of tape.

TWO and a half years ago the Reader's Digest Association replaced an IBM 370/145 by a second-hand 360/65 at its computer centre on the edge of the City of London (CW, February 6, 1975). And today the company looks back on a very successful, if unusual, upgrade.

"It's a superb machine," says Maurice Thorne, computer services manager. "We get more than 97 per cent processor reliability. All our systems run as batch jobs and we get 1.9 times the throughput of the 370/145. We do all the work in three shifts, whereas it used to take four. We have saved a lot of money on the 360 not only from the lower cost of the machine but also from staff savings."

Reader's Digest chose the 360/65 after looking at a 370/158, which was too expensive, and enhancements to the 370/145. These would have extended its life by only another year.

"There were a lot of 360/65s around at the time and nothing could touch them in terms of price," says Thorne. "Ours was worth about $400,000, whereas a 370/145 cost more than $500,000 and a 370/158 $1.5 million."

Reader's Digest now has three 360/65s in the US, two in France and one each in Australia, Canada, Italy and the UK.

The UK company leases from CIG Leasing, because initially it had doubts about how long the 360 would last. Now, however, the company is confident enough to extend the lease to 1980.

The lease deal has proved profitable. "CIG leased from us the 370/145, which we had bought, and installed it in France. In fact we were getting more from them than we were paying for the 360. By holding on to the ownership of the 370 we kept our options open in case of trouble with the 360. But last year we sold it to CIG."

The 360 was previously used by Xerox Corporation in the US. Reader's Digest attached disc drives from the 370, bought new tape drives from Telex and has recently upgraded the memory with 256K from Itel. The configuration is now 768K of memory, 16 tape drives, 12 Telex 30 Megabyte disc drives and eight IBM printers. The company is looking at the possibility of adding another six tape units.

The emphasis on tapes is due to the fact that the main customer file, which is updated every night in a three-and-a-half-hour run, is too big to store on the discs. It is kept on 45 reels of tape.

The 360 runs under Extended Disc Operating System supplied by The Software Company of Richmond, Virginia. The system gives six partitions including three main processing partitions and one for spooling. "It gives us as many as IBM's DOS/VS without a lot of the fancy IBM facilities we don't need," says Thorne.

IBM has been "very constructive and professional" about the move to the old machine. "They beat at you for a while then regroup and attack the next stage — in our case an order for a replacement in 1980."

Has having an old system and a mixed configuration posed any support problems?

"We are probably no worse off than other installations," says Thorne, "although we sometimes question whether IBM engineers are as good as they could be. They are probably more used to newer kit.

"Telex maintains the tapes and discs and Itel the memory and we sometimes lose a little time because of the ambiguity of some faults, but on the whole Itel and Telex assume the fault is theirs until it is found to be IBM's. The operating system is supported from the US but we have had little trouble with it and besides our own software manager is very close to the system."

The 360 has been so successful that the company is considering getting another second-hand machine in 1980. "A 370/158 will not be enough: it would only give us between 20 and 30 per cent more power," says Thorne. "But the fact that IBM has brought out the 3033 will probably mean that a lot of secondhand 370/168s will be available."

USER VIEW

Main foundation for reliable software is correctness

MAJOR changes in the attitudes and practices of programmers, systems analysts, managers and administrators are needed if end users are to be served properly. So says a report* on software reliability from Infotech International. It is part of the State of the Art series.

Correctness is the main foundation on which reliable software can be built, but the desire of computer staff for efficient programs too often overwhelms the need for correct programs, says the report.

It points out that as far as the end user is concerned the most important factor is that the software performs the required tasks — no more and no less.

The report says that although the development of reliable software is still way behind the development of reliable hardware the gap is narrowing, but very slowly. The costs of software development and of correcting errors has led to a lot of work in areas like program design, software validation and computer-aided software development — producing executable software directly from a set of functional requirements.

The report looks at the economics of software reliability, ways of designing reliable software validation and program testing.

*Software Reliability. 700 pp. £95, or £72 if bought as part of the State of the Art series. Infotech International Ltd, Nicholson House, Maidenhead, Berkshire SL6 1LD. Telephone 0628 36031.

Burroughs cuts repair time

CUSTOMER support engineers at Burroughs are being equipped with a portable digital test unit which the company claims is cutting the time to repair its smaller systems and terminal controllers by up to 40%.

The test unit was designed by Burroughs for use with its B80, B900 and B1800 series of computers and with several of the company's range of terminal systems. The company says the unit replaces the oscilloscopes and other test equipment the engineer normally needs and provides firm results rather than things like wave forms on oscilloscopes, which have to be interpreted by the engineer.

George Johnson, head of Burroughs' field engineering division, said future products from the company would be designed with the test unit in mind. He said there were about 1,500 units in use, but by the end of the year there would be 2,500, 80% of them built to an updated design.

Johnson said that hardware measurement technology was failing behind computer technology: "It's beyond the scope of the measurement industry today. It presents a problem but we think we have a solution."

Pelikan ribbons

In the report on teleprinter ribbons for the Diablo Hytype II (User Forum, August 11), the specifications were printed incorrectly. The ribbons are made by Pelikan of Switzerland and measure 0.35mm by 20 metres. They are marketed in the UK by Allison Computer Media.

Cleaning troubles

CLEANING problems in computer suites will be discussed next month at the fourth annual workshop of the National Computer Complex Cleaning Committee. The committee, a non-profit making organisation, was set up at the instigation of the Science Research Council to create awareness of the importance of cleaning to hardware performance and to the protection of staff.

It is being held on October 21 at the Industrial Centre, Carlton House Terrace, London SW1. The fee is £18 including lunch. Further details can be had from the committee, c/o BICSc, 87-89 Central Buildings, 24 Southwark Street, London SE1 1TY. Telephone 01-407 2304.

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Microprocessor News

MuPro 8080A-based development system

A NEW 8080A-based micro computer development system has been introduced in to the UK by Microsystems Services which offers several enhancements over currently available products.

Manufactured in the US by MuPro Inc of Sunnyvale, California, the system features a complete 8080A microcomputer, control panel, in-circuit emulator, dual floppy disc drive system and an extensive software package. This comprises a multi-task real time executive, a high-level relocatable output assembler, a disc operating system and a text editor.

An important feature of the hardware is the provision of the control/display panel, which provides complete control of the system without imposing software restrictions. It enables memory or register contents to be examined or changed, hardware break points to be set, the last 64 instructions executed to be traced, and program loops to be executed a pre-set number of times. This means that all the memory in the system is available for use, with none of these services taking up memory capacity.

The software includes a MuPro-developed assembler known as BSAL-80. This features a high-level syntax structure which uses Algol-like statements.

It has been developed to allow the adoption of a block-structured approach to applications programs. The use of the hardware control panel also removes the requirement for a monitor program.

Debugging user systems in real time, without the need to change the real time environment, can be carried out with the MuPro 80-ED in-circuit emulator. It supports a user clock period from 350 to 1,000 nanoseconds, and therefore enables memory mapping between the user system and the development system to be carried out. It also allows the user system to employ the development system's I/O.

The in-circuit emulator can also be used, with a suitable power supply, as a stand-alone system for a variety of portable applications, such as system commissioning or field maintenance.

The dual disc operating system supports the IBM 3740 soft-sectored format, and the single card controller can handle either two dual or four single drives. The controller features a high speed seek mode — which can cover 76 tracks in 100 milliseconds — a built-in real time clock, a DMA data transfer function, and manual or processor controlled diskette ejection.

Although based on the Intel 8080A, the system will also support several other processors. These currently include the 8048, 8085 and Zilog Z-80, while the Motorola 6800 is likely to be included next year.

Bi-directional bus translators

TWO large capacity bi-directional bus translators have been introduced by Motorola to provide data transfer between an M10800 ECL processor and TTL compatible signal lines.

Designated the MC 10804 and MC 10805, the devices offer two valuable functions. The first is in the prime role of bi-directional bus translator. The second is as a bi-directional input/output port and translator using the latch as an internal store for data. Selection of these two functions is by use of the latch bypass line.

Each TTL output is tri-state bus compatible, and presents a high impedance load to the bus when not used as an output. The devices can also drive large capacitance loads, so that interfacing can be carried out with MOS circuits.

The MC 10804 is a 4-bit device, assembled in a 16-pin package, while the MC 10805 is a 5-bit device in a 20-pin package. They provide the capability to construct systems that use a high speed ECL microprocessor, interfaced to MOS memories and TTL compatible peripherals and sub-systems.

Noise generator from AMI

MUSIC synthesis is one of the many potential markets for the "personal" microcomputer system, and a wide range of sound generators is now available. A new device to join these has just been introduced by AMI Microsystems which uses a different approach to the problem of proving percussive sound.

The S2688 Noise Generator replaces the traditional route of the semiconductor junction with a 17-stage shift register which uses exclusive-OR logic to produce a pseudo-random broadband white noise signal. This approach produces a signal of uniform output amplitude and quality.

Using the S2688, percussive sounds such as brushes, drums, maracas, and sand boxes can be produced, together with other miscellaneous sounds like air from a pipe organ.

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Change of name for company

COMPUTER services company Hoyle Magnetic Management of Halifax has changed its name to QRH Software Ltd.

Managing director is Alan Sparks, taking over from Stephen Hoyle who is now chairman. Sparks joins the company from Burroughs, where he was Bradford branch manager.

Formerly computer systems support manager with Burroughs, Raymond Pettit joins QRH as a systems director.

Val Pinder has joined Harrison Computer Services as a systems analyst, and Denzil Cardoza has joined as a programmer. Both formerly held the same jobs with Framlington Computer Services, a subsidiary of London Merchant Securities.

Ian Burstow has become marketing director for Ultra Electronics (Components). Formerly he was product manager with Sandvik UK.

PEOPLE

A TWO-WEEK advanced computer networks course held at Trinity College, Dublin, in August attracted academic and professional computer scientists from Canada, Germany, Holland and the US as well as the UK and Ireland. In our picture two of the course directors, Michael Purser and Dr Neville Harris (right and far right) are seen with Dr E. Raubold (left), a lecturer at the Institut fur Datenverarbeitung der Gesellschaft für Mathematik und Datenverarbeitung in Germany, and Donald Davies, superintendent of computer science at the National Physical Laboratory.

Graham Hawker, manager of the special projects department of GRIP, the company which provides computer services within the Grand Metropolitan group, has been appointed technical director.

Chris Lancashire, former senior sales executive with Honeywell, has joined the VLI Group as sales manager for Computer People North. He will be based in Cheadle Heath, Manchester.

Ugo Draetta, until lately counsel of Compagnia Generale di Elettricità, an affiliate of General Electric of the US, has been appointed counsel for the Europe business division of GE of the US at the Brussels headquarters. He succeeds Walter Beaman who is returning to the US.

Les Abbott becomes regional manager of Quadrant Software's Sheffield office. He joins from Univac where he was North-Eastern branch manager. Jeff Spencer joins the Sheffield office as regional marketing manager, from Rolls Royce where he was chief programmer.

Joseph Sisco has become a director of Raytheon in the US. He is president of the American University of Washington, DC and a former Under-Secretary of State.

Robert Conti has joined Pertec in California as sales manager, from Digital Computer Controls where he was Western regional sales manager.

Bob Martin, formerly marketing manager of Kolor Continuous, has become MD of computer supplies company Crowndata.

Gareth Butterworth, lately of Electronic Rentals where he was a systems analyst, has joined Redifon Computers in the same capacity and will cover the North Mersey area.

Previously secretary to the product marketing department at Redifon Computers, Angela McCarriston has been promoted to product marketing specialist, visual communications.

Suzanne Press has rejoined Harris Systems as a systems engineer, after a spell with Intedata in a similar job.

Mike Sanders will be the director responsible for Univac's new manufacturing region division for marketing and support of UNIS control systems.

Douglas Norby has been appointed senior vice-president, finance with Itel Corp in the US. He was vice-president, finance with Itel from 1968-73, since when he has been vice-president of the First Chicago Corp and vice-president, finance of Fairchild Camera and Instrument.

Tony Hyde has joined Geest Minicomputer as a senior systems analyst from CRL Abacus where he was an analyst. David Mackenzie-Campbell, a sales consultant, has transferred to the minicomputer company from Midlands Computing Centre, Geest's bureau.

de Bage Abbott McCarriston Press

Jeremy de Bage has joined RTZ Computer Services as manager of its joint European contract personnel service with Inforama, the Paris-based systems house. Until recently he was marketing manager for Euroco.

Terry Willingham has joined Anglian DP Services as a systems and programming consultant. Previously he was with Raychem in Belgium as a systems specialist, and he set up their multi-national teleprocessing system.

Amdahl appointments

IN addition to the appointments of Jack Lewis and Bill O'Connell as president and vice-president corporate marketing respectively, Amdahl deputy chairman Eugene White has announced that Harold Shattuck, vice-president engineering, is to be vice-president operations with responsibility for world wide engineering and marketing.

Other appointments include James Dutton, formerly responsible for marketing in the eastern US, to take responsibility for the whole country; and Kenneth Simonds, previously responsible for western US marketing, now takes over consolidated marketing support and service for the whole of the US.

CONFERENCES

INFORMATION about Sicob's Convention Informatique and the Salon International des Composants Electroniques, taking place in Paris, the former on September 19-23, 1977 and the latter on April 3-8, 1978, may be obtained from Promosalons, French Trade Exhibitions, 196 Sloane Street, London SW1, tel: 01-235 4234/5.

A WORD PROCESSING conference and exhibition has been organised by the Scottish branch of the Institute of Management and will be held on October 31 at Glasgow City Hall. Speakers will include Keith Wharton, publisher/editor of Word Processing Report International Edition, Cyril Howarth of West Midlands Gas and John Thorburn of the Scottish Widows Fund Life Assurance Society. For further details contact the Conference Convenor, Alan A. Stewart, Bird Semple and Crawford Herron, 249 West George Street, Glasgow G2 4RB, tel 041-221 7090.

COURSES

PRACTISING systems analysts and systems staff with no formal training in systems analysis and methodology can benefit from an Infotech course. The Technique of Systems Analysis will be held in London on September and November 14-18, and further details may be obtained from Mike Edgar, Infotech International on 0628 ...

FOUR one-day conferences on the Consumer Credit Act, employment protection law, participation and industrial democracy, and avoiding the pitfalls of unfair dismissal have been organised jointly by Inbucon and ICFC's Management Studies Centre, and will be held consecutively on October 18-21 at the London Hilton. The two organisations are also offering six general management seminars this winter, on subjects such as modern accountancy and finance for managers and computer appreciation for business executives. Each seminar will take place three times between October and May. Details from the Course Secretary, PO Box 28, Camberley, Surrey GU16 5RH, tel: 0276 20314.

DATABASE design and database concepts are the titles of two of the range of course offered by the NCC this autumn. Others include project planning and control, structured programming and Coral 66 programming. The courses are held in either Manchester or London. Further details of these and other courses may be had from the Course Administration, National Computing Centre, Oxford Road, Manchester M1 7ED, tel ... 6333

A COURSE on artificial intelligence is now available for in-house use from Edutronics. The course is aimed at managers, analysts, programmers, computer scientists and computer engineers. It comprises 24 modules, a textbook and study guide. The lectures are presented on video tape by Professor Patrick Winston, director of the artificial intelligence lab at Massachusetts Institute of Technology, where the course was developed. Edutronics says the course provides practical knowledge for those interested in making computers more useful and insight for those who want to understand the nature of intelligence. The course is available in English and French. For further details phone Margaret ... 01-727 7464.

DIARY

SEPTEMBER 19
AGM/Computers as an aid to diagnosis. Dr C. C. Spicer. BCS Medical (London) Specialist Group. ICL Computer House, Euston Road, London NW1. 17.30.

SEPTEMBER 19-22
Applications of numerical software conference. Institute of Mathematics and its Applications, Southend. University of Sussex, Brighton.

SEPTEMBER 19-23
Anniversary meeting — presentations from member installations and database workshop. SHARE European Association (SEAS). King's College, Cambridge. Details: D. Hartley, Cambridge. Tel: 0223 52435.

SEPTEMBER 19-24
SAMA 77, Salon International de la Production Automatisée, SAMA International, Berne, Switzerland.

SEPTEMBER 20
900 and 4000 Group Meetings. Elliott Computer Users' Association. Imperial College, London. 10.00.
Parallel processing. D. J. Hunt, J. Emmerson. BCS Microprocessors Specialist Group. Polytechnic of Central London, London W1. 14.00.
Negative results workshop. British Pattern Recognition Association. University College, London. 14.00.

SEPTEMBER 21
III/D electronics and telecommunications, EEC. Christopher Layton. BCS, London branch. Café Royal, London W1. 17.30.
Viewdata — lecture and demonstration. B. Dew. IEETE. Broadhall Community Centre, off Hydean Way, Stevenage, Herts. 10.30.
Software houses — friend or foe? Vic Groves. BCS, Manchester branch. NCC, Manchester. 18.30.

SEPTEMBER 21-22
Meeting. IBM Computer Users' Association Management Group. Holiday Inn, Leicester.

SEPTEMBER 22
The 2900 implementation of Pascal/Gamma, a new language for systems implementation. BCS System Implementation Languages Specialist Group/Algol Association. Birkbeck College, London WC1. 10.30.
CLASS (Computer Local Authorities Superannuation System) symposium. Local authorities which developed CLASS. Manchester. Details: Mr Hardman, 051-227 5234, ext 2080.

SEPTEMBER 26-28
Distributed computer control systems — International conference IEE. Birmingham.

SEPTEMBER 27
Distributed intelligence, seminar. BCS. Café Royal, London W1, 9.30.
Computer fraud. J. M. Ross. BCS, Birmingham branch. Priory Dene Hotel, Edgbaston, Birmingham. 18.30.
The man/machine interface. Mike Cooley. BCS, S Wales branch. ... Hotel, Cardiff. 18.30.
Note: BCS Natural Language ... tion Specialist Group meeting ... cancelled.

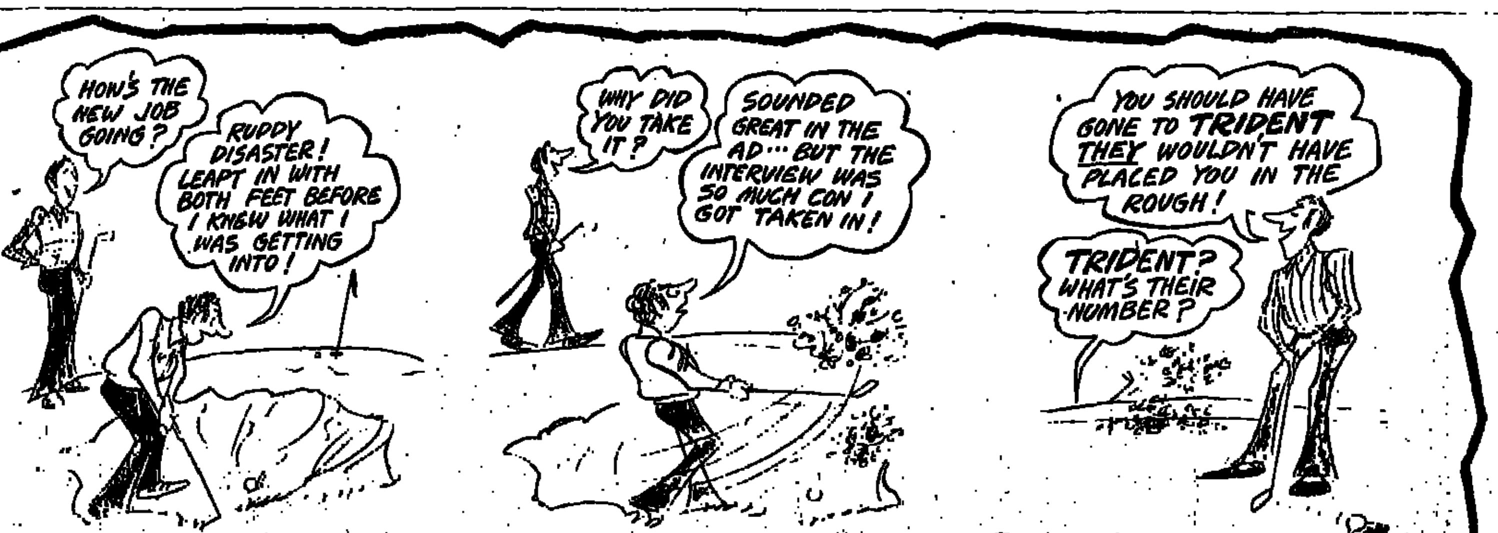
SEPTEMBER 27-28
Meeting. IBM Computer Users' Association System 3 Group. ... Hotel, London.

SEPTEMBER 27-30
Annual conference. Operational Research Society. The Queen's ... Magdalen College, University of ...

SEPTEMBER 28
Computer access to large data ... using alternative store technology ... Groves, Peter Waterworth, Roy ... BCS Information Retrieval Specialist Group. City University, London ... Tickets £1 from Pauline Walters ... BCS, tel: 01-637 0471.
The protection of data by cryptography, seminar. NCC/NPL. ... Hotel, London W2. 10.00

SEPTEMBER 28-29
Meeting. IBM Computer Users' Association Local Authorities Group ... shire County Council, The ... Winchester.

SEPTEMBER 29
Annual dinner. G. A. Fisher ... honour. BCS Advanced Programming Specialist Group. Tickets ... P. J. H. King, 10 Gower Street ... WC1. 19.30.



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ICL to build R & D centre at Wythenshawe

OUTLINE planning permission has been given to ICL by the Greater Manchester Council to build a research and development centre on a 33-acre site at Wythenshawe to house 1,300 R & D personnel now based at ICL's West Gorton premises.

ICL stresses that this is an early stage in a long-term plan to relocate the West Gorton staff and points out that the Wythenshawe site still has buildings on it, including South Wythenshawe High School. ICL also has to receive approval from Manchester City Council before it can go ahead.

ICL says that the 700 production staff at West Gorton assembling 2970 and 2980 mainframes will stay there. The 1,300 R & D personnel are involved in medium and long-term system design, the development of circuit interconnection technology and the evaluation of new components and circuits.

Meanwhile in London ICL is closing its training centre at Radley House, Ealing. First level operating courses are being transferred to Letchworth where there are 26 systems available for trainees, while other operating courses are being transferred to ICL's centre at Beaumont, Windsor, along with the programming courses provided at Radley House.

The Ealing centre was opened in 1964 by English Electric Leo Marconi and has been training about 6,500 students a year. It will close next month.

OP SPOT

... offers guidelines for the good of documentation.

GOOD documentation is an ideal demanded by many, and unfortunately practised by few. Efficiently, that is.

Who is responsible for documentation? Most obviously, the person writing the system. But in many installations it is advisable to assign a supervisory responsibility, otherwise the buck for documentation is constantly passed, in ever widening circles.

When should documentation be raised? Definitely before a project or system is introduced for test running, even if it is found subsequently to require amendment. Experience shows that any documentation is better than none.

Who receives documentation? Well, within certain guidelines, anyone who can justify a need for it. If documentation is well distributed throughout an installation there is no reason for questions to be asked. But if this is the case, there must be a central person with responsibility to ensure that all documentation is updated as needed, and that acknowledgment is received of all updates issued.

Amended updates to documentation should be checked for accuracy by the recipient, if at all possible, rather than merely being filed. Out-of-date documentation should be destroyed promptly.

In the midst of these guidelines for the good of documentation, it is essential that a sensible balance be kept between too much and too little.

It is imperative that all remember documentation as being a means to an end, and not an end in itself.

Case stands by its £500,000 refusal

THE Department of Industry has decided not to intervene in the disagreement between communications manufacturer Case and the Post Office over contracts for multiplexers worth £1 million. Consequently, Case is standing by its decision not to accept its £500,000 share of the contracts.

The dispute arose when the Post Office decided to split the multiplexer order between Case, and Infotron Systems of Dorchester (CW, August 18). Infotron Systems is the European marketing outlet for Infotron Corp of New Jersey.

The Post Office contended that the Infotron multiplexers included features not available on the Case product. Case complained that its own new multiplexer, due for delivery in a matter of months, would offer all the features of the Infotron Timeline 780 devices, and several more, and that it was wrong for a public corporation to give contracts to a US company when there was a British company with a product developed with the aid of public money almost ready for delivery.

Infotron Systems countered that it is majority owned by British interests and that the Timeline 780 devices would be about 60% manufactured in UK.

The Department of Industry has said it is prepared to meet Case again to discuss the matter, but is likely to stand by its ruling that the commercial decisions are a matter for the Post Office, and that the DoI inquiry demanded by Case would be inappropriate.

Case believes that its decision to reject the Post Office order for its 672 multiplexers will cause sufficient delay in final award of the contracts that its new device will be ready to enter the ring in competition with the Infotron device in a re-run of the tender contest.

The company is unconcerned at the prospect of Infotron getting the full £1 million contract, because it believes that users will opt to buy the new Case device and lease their own lines in preference to using the Post Office Dataplex service, which is a package including lines and multiplexers. As a result, Case expects the Post Office will be left with a large stock of unused multiplexers.

Changing industry

US computer service companies will be discussing how to respond to changes in the industry, at the 47th management conference of the Association of Data Processing Service Organisations in San Francisco on October 19, 20 and 21.

The conference theme is "responding to change — a program of action" and workshops and meetings will look at topics like security, women in management, how to make money in the mini and microcomputer OEM market, marketing and promotion on a small budget, and IBM and the services industry.

Further details can be had from ADAPSO, 210 Summit Avenue, Montvale, New Jersey 07645, USA. Telephone (201) 391 0870.

Befriend a school

TEACHERS in the Birmingham area can now draw on the experience of British Computer Society members for information about developments in the computer industry. The BCS Birmingham branch has started a "befriend a school" scheme with the Computer Education Group, a local group of teachers interested in computing.

The scheme was inspired by the government Green Paper on education which urged teachers and industry to get together to understand each other better.

"Teachers have a basic grounding in computing but not practical experience," said John Gwillyam, BCS branch committee member. "If they have no contact with computing professionals they only talk among themselves."

Data prep service

A DISKETTE data preparation service for IBM 3740 users has been opened in the West End of London by Abraxas Data Preparation Services. Aimed specifically at System 3 and System 32 users, the service will run alongside the existing Inforex key to tape bureau. It can cope with a variety of tasks, from absorbing work overloads from large installations to complete file creation for first-time users.

Plessey expands micro range

TO meet a growing demand from customers who wish to construct microprocessor systems from card level up, rather than from component level, Plessey Microsystems has introduced a range of system modules based on the Miproc 16 microprocesser.

The modules can be mounted together in a new chassis system, designated the Miproc 16-AS Application System, that is specifically aimed at the OEM market. To complement this improvement in the hardware capability of the Miproc, Plessey has also introduced a new high-level language for the machine, and a faster version of the basic processor.

The chassis system is available in two types, a primary and secondary card bay, which can be used in a variety of combinations. They use a standard Tri-state backplane so that memory and interface modules may be located in any position. Only the processor card has a dedicated location.

The processor card includes the 350 nanosecond Miproc 16, 16-bit CPU chip together with an optional index register/interrupt module and an optional hardware multiply peripheral.

The memory cards currently include a 2K high speed bipolar RAM, an 8K high speed bipolar PROM, an applications memory providing 4K PROM and 256K RAM and a 2K CMOS RAM with integral battery for non-volatile storage.

The interface cards include a programmable serial line interface, and a two-channel 16-bit parallel bi-directional I/O card. A six channel parallel input card and a six channel parallel output card complete the module line-up.

The new high-level-language, PL-Miproc, uses Algol-like statements and a free format, block-structured approach to reduce the time taken to produce applications software.

Designed to run resident on a PDP-11, like the standard Miproc assembly language compiler, the new language allows the programmer to return to assembly language for super-critical program areas, where PL-Miproc is unable to provide sufficient definition.

For applications that require higher operating speeds, Plessey has also introduced a 250 nanosecond version that is both hardware and software compatible with the standard device. Available at the end of this year, the device will feature pipelined fetch and execute functions.

Keynote

ANOTHER order has been placed by the British Steel Corp for CMC Keyprocessing equipment, a six-station system worth £34,846. For installation at Shelton Works, Stoke-on-Trent, it will be linked via a landline to BSC Scunthorpe.

When you are choosing system hardware and software don't forget the hidden costs; writing and commissioning additional programs, reconfiguring or extending the system as requirements change, checking and maintenance. The real cost of a system includes all these and there's no getting away from them.

The sad truth is that the less thought the manufacturer gives to the initial equipment the more you're likely to have to spend on programming, monitoring, modifications and maintenance. Especially with escalating costs for the services involved.

Argus 700 systems are designed to minimise these costs. High level languages and operating systems allow accurate programming, rapid commissioning and speedy fault diagnosis.

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Our systems experience is also expressed in the monitoring and commissioning aids. They include, for instance, a real time CRT monitor which allows you to examine 16 instructions or memory locations simultaneously.

The Argus 700 is a system man's computer, matches hardware to software in a cost-effective package and steers you clear of systems' icebergs.

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Argus 700-the system man's computer

FILE DESIGN

By Owen Hanson

Part 12

Security

In this concluding part of the File Design Series, Owen Hanson discusses those aspects of security that can be directly influenced by the file designer. References to security in the wider sense are also given.

DATA file handling will be planned to avoid errors, and to put right any errors that do arise as quickly as possible. This may be within the run itself, after the completion of a processing run or by the use of alternative machines and data depending on the severity of the errors that have occurred.

The wider aspects of security have been covered by James Martin[1], and the specific precautions that can be taken by programmers are discussed in the NCC Programming Standards publication[2], and in Keeping Computers Under Control, edited by the author of this series and Andrew Chambers.

Avoiding read-write errors

A file held on magnetic disc is seldom corrupted due to mechanical write errors; however, extra certainty can be provided by ensuring that the information recorded on disc is the same as that held in the I/O area. This is done by issuing READ and COMPARE instructions after the WRITE. It will mean waiting an extra disc revolution after each write, and for that reason it adds markedly to run times.

Magnetic tapes are relatively error prone, and the read-after-write check is usually standard, using two separate read/write heads. Tapes normally re-try records that are in error.

The more expensive modern tapes will have two parity bits per character, and can put right all one-bit errors and many two bit errors in flight — that is, without need to re-wind and try again. If these are available they should be used on the most important or largest files. In this way they will minimise tape-passing time.

Re-starting a run

Very long runs present a special problem. Breakdowns caused by power or mechanical failure become more likely the longer the run, and at some point it may become difficult to finish the job at all, due to its length and complexity.

Perhaps the run produces a production plan. Even if failure is unlikely it is not sufficient to re-run the program and give the results on Tuesday, if the plan is to start on Monday.

These problems can be handled by taking checkpoints at intervals during the run. After a failure, the run can be re-started from the last checkpoint, rather than from the start.

On magnetic tape a checkpoint system is easy to implement. Reels are backward spaced to the appropriate checkpoint record, any reels that have been removed are replaced, and all processing since then is carried out once more.

Magnetic disc files are more complex, as the records are updated in place. Checkpoint records have to be used to restore the files to the state they were in when the checkpoint was taken, and this may take some time.

The loss of time due to checkpoints will increase run times as shown in Figure 1. For very long runs, or under difficult conditions such as intermittent power failures, the average time of a run may be reduced by using checkpoints as shown in Figure 2. This is rather unusual, as probabilities of failure as high as 0.2 are not often met. More often the limited time available to complete a run is the reason checkpoints are taken — see Figure 3.

Repeating a run

The output from a run, or the examination of check data in file trailer labels, may show that an error has occurred. The run may have to be repeated, and if the master file has been corrupted it will first have to be re-created.

Magnetic tape back-up is usually provided by the grandfather-father-son method, sometimes extended to twenty or more generations. This is easily arranged as updating involves the creation of a new file on each run.

Again disc causes extra problems, as updating is carried out in place. Files have to be dumped to tape at intervals and restored to disc when necessary to re-create the file.

Recovering from disaster

Fire, bombs, earthquakes, etc, provide a challenge to the designer. Not only the data file, but also the hardware may be lost. In this case recovery depends on:

a) The availability of a compatible machine. This means that a CPU large enough to hold the program, compatible devices, the same operating system and all necessary special features must be available.

Some companies have identical installations in several centres, giving automatic back-up. Smaller companies will have to find as close a fit as possible among other users. Often this means that one partner is fully backed up, while the other can only run programs that require a limited set of facilities on the installation available. The system designer should seek for as high a degree of compatibility as possible in looking for a back-up partner.

b) The availability of data. Copies of files and updates will have to be stored at a distance, preferably in different buildings, and renewed regularly. The use of fireproof cabinets in the computer room gives some security, but not sufficient to ensure the ability to re-create the operations of an installation in all circumstances.

References

1. Security Accuracy and Privacy in Computer Systems, by James Martin. Prentice-Hall. 1973.
2. NCC Programming Standards. National Computing Centre.
3. Keeping Computers Under Control, Andrew Chambers and Owen Hanson (eds), Geo and Co, 1976.

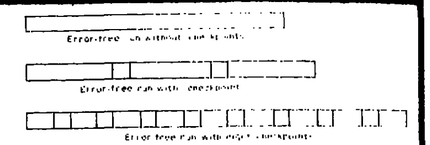


Figure 1. Checkpoints add to the time taken by an error-free run.

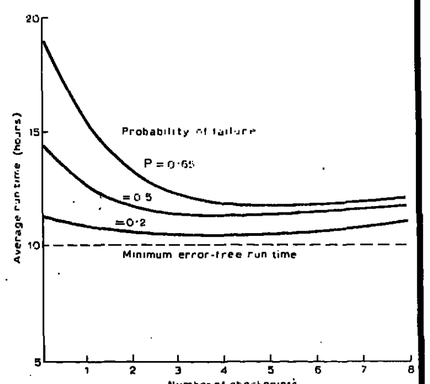


Figure 2. As the probability of failure increases, the reduction in average run time achieved by checkpoints becomes more marked and the number of checkpoints that gives optimum results increases.

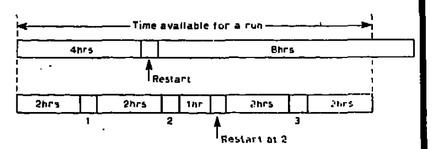


Figure 3. Checkpoints reduce the overall time of a run after failure. This allows runs to be completed within a given time limit, but increases the run time of error-free runs. The top band shows the re-running of a job without checkpoints; failure occurred halfway between checkpoints 2 and 3. The lower band represents re-running from the appropriate checkpoint; failure again occurred between checkpoints 2 and 3.

Micro consultancy formed

A NEW consultancy specialising in microcomputer applications has been formed by a group of research workers from City University in London. Called Jebal Microsystems, the consultancy has already delivered a number of special purpose microcomputer systems generally based on the Mostek F8, but it intends to specialised in applications for the Ferranti F100-L.

The consultancy can offer feasibility studies, simulation studies, system design, prototype production, in-house training and trouble-shooting facilities and is prepared to look at any application, especially 16-bit operations.

Advance in data security

● From Page 4

The public key is the product of a 64 decimal digit prime and a 65 decimal digit prime, and the two factors constitute the secret key by which number-theoretic methods allow the decipherment process to be constructed. The cryptosystem depends for its strength on the fact that large primes can be found relatively quickly, but factoring their product is a lengthy process — it is estimated, for the example given, that it would occupy 10^{25} years by the best known method. Presumably number theorists have been working on this problem long enough to give confidence that no easier way will be found for some.

The new cryptosystem comes from Rivest, Shamir and Adleman of MIT. The article in Scientific American states that Diffie and Hellman are applying for patents for a public-key cryptosystem.

Supposing that these systems prove both convenient and secure, they will make cryptography simpler and cheaper. Distribution of keys was otherwise be a big impediment to the wide use of cryptography in the large community, where anyone might want to communicate with any other.

Ferranti for 14 ports

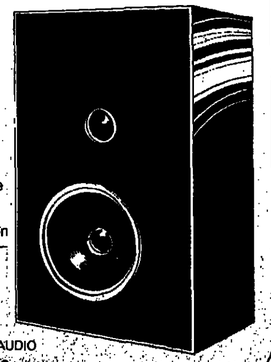
HM Customs and Excise has placed an order with Ferranti for PT7 programmable terminal systems to be installed at major sea and air ports. It will provide online entry and interrogation, with the mainframe installed at the Customs and Excise Central Processing complex at Southend.

Each port will have two Argus 700E processors, and each will operate with a printer, a floppy disc drive and VDUs. A total of 28 700Es, 188 VDUs, 14 floppy disc drives and 28 printers are involved.

Greek scanner

GREECE is the latest market for EMI's computerised medical X-ray scanner. The first CT5005 general purpose scanner has just been installed in a private clinic at the Advanced Research and Therapeutic Institute in Athens.

BUILD A 'CLEAN SOUND' LOUDSPEAKER



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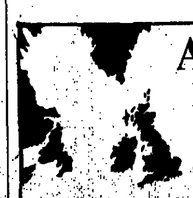

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SYSTEMS AND SOFTWARE

While the cost/performance and reliability of computer hardware have improved greatly over the last 20 years or so of commercial data processing, software development is as bug-ridden and problem-laden today as it has ever been.

Indeed, with small mini and micro-based systems, applications software development costs are starting to overtake the costs of the hardware and have led to the demise of more than one small systems supplier foolish enough to lumber itself with helping customers with the job at no extra charge.

At the same time, computer users in general are finding that they do not automatically save money by opting for a standard package from an outside supplier to handle a job while computer manufacturers undoubtedly face hazards when farming out development work to independent software houses — even though this can often pay dividends.

These matters and others are discussed in this supplement on software and systems. It opens with a dissertation on the pros and cons of standard packages from David Gomes da Costa, managing director of Management Systems and Programming.

Why program products are growing fast

By David Gomes da Costa

David Gomes da Costa . . . "Senior management in many companies still lacks a clear idea of what DP is all about."

THE impact of packages, or program products as they are more properly known, is growing. In 1975 a Computer Weekly article anticipated that sales in the US would grow from $500 million in 1974 to $1600 million by 1979. That scale of growth seems typical of the rest of the world today.

There are three main reasons for the increasing success of program products. These are: because a product purchase price is always less than the cost of an equivalent in-house development; because the speed of implementation is always greater; and because a program product with many users should be more effectively proven than the first "fully working model" produced by a DP department.

Having said that, it is necessary to admit that there is still a great deal of buyer resistance to the idea of obtaining software outside. This is particularly true in the UK, where sales resistance has developed to a level where it acts as a real deterrent to true corporate efficiency.

Most of the reasons for this appear to be subjective. Senior management in many companies still lacks a clear idea of what DP is all about. If asked for money to purchase, say, a TP monitor, they are too ready to make criticisms about all those expensive staff who do not appear to be able to do their jobs.

Again, the history of product sales has not been a happy one. Cowboy vendors, particularly in the early seventies, have left behind a considerable distrust of manufacturers' aims. This applies in some measure to hardware as well.

It is only when logic is applied to subjective resistance that obstacles can be effectively removed. At its base level it is worth remembering that it was once considered worthwhile for companies to develop their own hardware. The Leo machines built by J. Lyons are evidence of this.

The only area in which this would be considered today would be in highly secret military configurations — or else among micro-freaks who want to automate all household functions. The same trend is visible on the software side, for very few companies would contemplate designing and building their own DBMS.

The problem for the buyer seems to arise when a desired system appears to be within the capacity of an in-house development team. However, if an appraisal of available proprietary products were conducted as an automatic function of systems development it is probable that good, justifiable reasons could be produced for buying from outside.

There are, naturally, some applications that are unique to a given organisation. These are the ones for which no program products would be built — it simply would not be profitable. On the other hand, by using program products wherever possible an organisation's staff is free to use its specific experience to make the best job of developing those unique applications.

The growing understanding of this fact is shown by an analysis of the ICP Million Dollar Awards. As can be seen, some 60% of products sold involve systems software, and just over 33% of the total are directly concerned with data management. Clearly, "external" budgets are being concentrated on complex systems generalised for many installations, while in-house staff produce the majority of applications systems.

How then should a DP department go about deciding whether or not to purchase a given product, and also justifying that product to the financial overlords?

The initial steps in the process are exactly the same as for any other project. Someone recognises a need, and the DP department is asked whether it can help. In the case of systems software the DP department recognises the need for itself, and looks for its own solutions.

The recognition of a need can come about in two ways. Sometimes it is the natural result of an organisation's activities — a company employs people and therefore needs a payroll system. Other needs — particularly in terms of operating efficiency — exist and are recognised, but are, so to speak, beyond the bounds of current technology.

Today's proliferation of DBMS is an example of this. The need obviously existed for some time but very few installations attempted to tackle it before generalised systems were available on the market. In other words, the need was not widely recognised until people learnt of ways in which it could be fulfilled. Such information may come through the DP press, various product surveys, or through sales literature received through a mail shot.

Once the need has been recognised, by whatever means, permission is gained to carry out a feasibility study. This establishes two important factors. Firstly, it pinpoints the exact requirements — and should establish priorities as well. Secondly, it should estimate the gross savings that the system is expected to produce.

At this time a management presentation should be given with the three aims of gaining approval to advance to an in-depth study; of agreeing timescales; and of establishing broad budgetary limitations.

The next step is to cost the in-house production of such a system. This should take into account a typical programming cost (including overheads) of about £15,000 per man year. It should also include an estimate of future maintenance which will run at the very least at some 20% a year of the original development cost. Indeed, figures produced by IBM suggest that 65% per annum is a more realistic figure.

Finally, it is essential to take into account the development time delay before any savings can be realised. The importance of this can be demonstrated by MSP's newest product, Datamanager, which has already consumed some 30 man years of development resources. Very few companies could realistically divert sufficient staff to the development of such a system if they wished to make savings within a reasonable length of time. This is especially so when it is considered that a typical price for Datamanager is only around £12,000.

Once this study is complete it should represent the standard against which to measure proprietary products. It will have the required functional characteristics in order of importance, preferably using weighted factors, and it will have identified the future effect on the DP department in terms of resource usage. In addition, it will provide an all-important price guide.

It should then be normal practice to examine all up-to-date proprietary products in relation to what has been researched, and yet this is the step that is most frequently overlooked. One of the main reasons for this is that most installations hold very little information on what products are available.

Frankly, there is little excuse for this. There is a multitude of software directories in print, and in addition, the trade press is full of announcements of new products. IPC publishes Computer Products International, and DP departments are constant recipients of suppliers' marketing literature.

Also, the NCC provides information on products under various headings, and it should be a standard function of any future planning section to file and catalogue all such details against future requirements.

Investigation of the media will probably provide the names of a number of products which may, broadly spenking, fulfil the requirements of the proposed system. Accordingly the basic facts, consisting of brochures and product overviews, should be obtained and examined in relation to the criteria established by the feasibility study.

Very quickly it should be possible to make a short list of perhaps three or four products simply because the others will not match basic needs. Those rejected may be for the wrong machine range, or require too much memory, or may be designed to carry out some completely different function altogether.

It is then necessary to attend suppliers' presentations, and to move on to a paper evaluation based on the complete reference documentation of the short-listed products taking into account the proposed in-house system. Apart from comparisons of features and facilities, this evaluation should include cost, and the evaluator should not scorn subjective judgements.

If, for example, the reference manuals are hard to understand then the product is going to be more difficult to use. If it is hard to contact the vendor to clarify certain points, then it is going to be hard to obtain decent service in the event of a breakdown.

This evaluation should also take into account the history and stability of the vendor, and also a subjective assessment of the vendor's staff. Are they really conversant with their product? Or do they constantly have to pass on questions to some "master-mind"?

Again, there is little point in evaluating the reference documentation unless the product is exactly as specified. This can be confirmed by checking with existing users. User comments should also be gleaned on other aspects of the relevant product, and should be accumulated as a result both of a telephone survey and of one or two on-site visits.

Provided all these steps are followed the complete evaluation should throw up one — or at most two — products as being the most likely competitors for an in-house system. These products should then be put through a meaningful period of live acceptance testing for final proving.

The results of carrying out this structured approach to system evaluation are twofold. First, it will be possible to select one product as the most suitable. Secondly, a full cost comparison can be carried out between the program product and the in-house system *based on real experience*.

This same experience can then be applied to the production of an implementation plan and management report. This document will be a précis of all the stages of the evaluation, and includes exact costings related to the original budget guidelines.

Presented properly, this document should be irrefutable evidence of the method to pursue, and board approval should inevitably follow. While it cannot be guaranteed, it is highly likely that the right program product will be significantly less expensive than an equivalent in-house development.

Evidence of this is given in a recent Auerbach survey. As just one example of many given, two users in 1976 built their own system schedulers for a total cost of $50,500. In the same year two others purchased system schedulers for a total of only $20,500.

It frequently happens that approval to purchase is obtain-

● Turn to page 15

talking computer

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Production and inventory control

By Graham Wynd

A primary aim of manufacturing companies is to deliver their products to the customers at the time they are required. Yet, according to a survey by the BIM, one fourth of the companies interviewed admitted to delivering less than half of their customers' orders in time, and this too at a time when most companies were operating well below capacity.

Graham Wynd, a senior consultant with Pactel, describes here the function of production and inventory control, which is to provide a balance between the two conflicting aims of the best possible level of customer service while incurring a minimum investment in stocks and work-in-progress, and using plant and manpower to the full.

A SURVEY by the British Institute of Management found that 25% of the companies interviewed admitted to delivering less than half of their customers' orders on time, and this at a time when most companies were operating well below capacity.

Yet it is a prime aim of manufacturing companies to deliver their products to the customer at the time they are required. It is also the function of production and inventory control, which seeks to provide the best possible level of customer service while incurring a minimum investment in stocks and work-in-progress, and using plant and manpower to the full.

It is the job of production and inventory control to provide a balance between these conflicting aims and I believe that this is of fundamental importance to British manufacturing industry.

Time and again, while visiting our clients in Europe, I am told: "We would love to do business with British companies, but there are two problems — your quality is too variable and we cannot depend on your delivery promises."

Economic recession has prompted management to look critically at all costs, especially inventories, and better techniques, such as material requirements planning, can make significant improvements. This type of method can achieve inventory reductions of 20%-30% and more.

. . . it is not just the production departments which derive benefit from the system . . .

Besides better planning, better control of work-in-progress will also contribute to reduced inventories. Through the routine reporting of overdue processes or materials, the reallocation of priorities and the rescheduling of operations, throughput times and work-in-progress can be dramatically reduced.

There is a side benefit accruing from cutting throughput time which can be just as valuable as the faster delivery or the lower inventory. This is the greater degree of flexibility which enables a company to react more quickly to changes in customer demand. In addition, with shorter lead times, there are fewer orders in progress on the factory floor at the one time and so the situation is easier to administer.

Improving the utilisation of expensive machinery is another benefit from production and inventory control techniques. This involves fewer set-ups for the operator, longer runs, less waiting for parts to arrive — and less time spent trying to accommodate rush jobs.

But it is not just the production departments which derive benefit from the system. Much of the same information is also necessary for costing. It is not unusual for annual recalculation of standard costs to take from three to six months and for these to be out of date by the time they are finished. Using the computer costs can be [illegible] overnight and, in inflationary times, this facility has enabled companies to keep abreast of price increases from their suppliers.

The benefits from a good production and inventory control system have brought companies competitive advantages, financial success and, for the employees, almost always a far greater degree of job satisfaction.

It is therefore surprising that it is only comparatively recently that production and inventory control has been identified as a separate and vital function in its own right.

As with many business ideas, the science of production control has generally emanated from the US and come to Europe via the multinational companies, the larger computer manufacturers and professional bodies such as APICS, the American Product and Inventory Control Society, and its British counterpart, BPICS.

It has long been recognised that the computer has an enormous potential in the realm of production control. In practice, however, its misuse has meant that there are still more unsuccessful computerised production control systems than successful ones.

In the early days, it was left largely to the DP professionals and the OR practitioners to design the systems. There was a tendency to assume that the computer should be used for mathematical tasks like forecasting and the calculation of safety stocks.

In 1964, one of the biggest breakthroughs occurred with the advent of IBM's disc-based bill of material processor. For the first time, computers began to be used for what they really are good at doing — storing all the nitty gritty details of manufacturing in such a way that they could readily be accessed and processed.

One of the secrets of good control systems is learning to handle the morass of detail, without falling for the generalisation. What counts at the end is despatching the finished product and the lack of seemingly insignificant and low value components can hold up large and valuable orders.

Because of the complexities involved in the programs, there has always been a strong incentive to use packaged software and, today, only the largest or most specialised users would normally consider developing their own.

Many software suppliers have tried to provide a set of software which is universally applicable to all companies, and have created systems which are incredibly complex.

The truth is that every manufacturing company is essentially different and, no matter how all-embracing the software is [illegible] fying to meet the user's requirements.

At the other end of the scale another type of software exists. With this, the user is offered a basic kit of subroutines which has to be put together to produce a unique version.

Not only is there a great deal of systems and programming involved, but it is impossible to test each section on a standalone basis because there are no defined results from any of the subroutines.

The aim of a package should be to provide a balance between these extremes. It should be comprehensive in its coverage of the basic production and inventory control functions such as bills of materials and routings, stock and work-in-progress recording, purchase codes, master production schedules, materials requirements planning, capacity planning, scheduling priority control and costing. With these features it will provide 90% of common features needed by most manufacturing companies.

. . . financial success for the company and job satisfaction for the employees.

When a user wants to extend its system, the software should contain basic provisions, such as fields in the file layouts so that there is no need to scrap what has already been set up.

The installation of a new system is for most companies a major undertaking and potentially very disruptive. The upheaval can be minimised, however, if the installation is in discrete stages, and the next stage is only attempted when the first is running reasonably well.

One great advantage of the computer is its ability to provide one central, integrated set of records for a company, rather than have a separate set for each department.

Keeping manufacturing data correct is also a problem, of course, and we normally tackle this by setting up a small "in- [illegible] vet the data being passed to the computer. It also enables engineering changes to be properly implemented in the computer database.

It is often more difficult to ensure the accurate reporting of shop floor transactions. The computer system can help to some degree, especially when online terminals are used.

Transactions like the reporting of operations completed, issue of materials, quantities scrapped, etc, can be validated almost instantaneously.

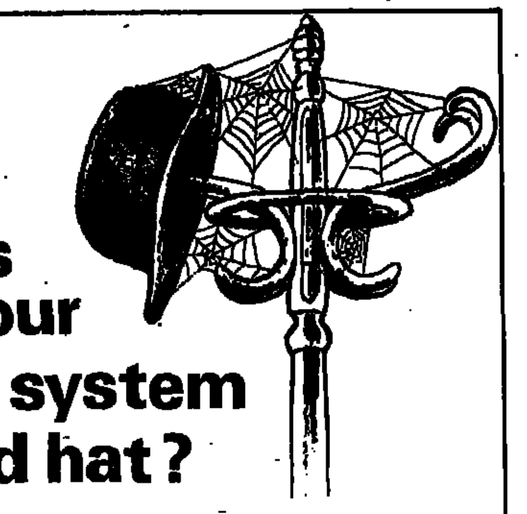
However, it is important that the introduction of these is fully understood by all personnel concerned. Even the most enlightened companies often underestimate how much education is required. Part of the value of education is that it makes sure everyone knows what is happening and there is then a greater likelihood of acceptance of the system.

Good work in training can be lost, though, if the problems of implementation, particularly in the area of shop floor control, are not closely monitored. Many companies are over ambitious in that they try and implement too much at the one time and this means that their "troubleshooting" personnel are spread too thinly to deal with problems as they arise.

One of the features of completely successful systems is that the end-users play a large part in their design. To make this happen normally requires the setting up of a multi-disciplinary implementation team with representatives from all the departments affected.

To accomplish a common understanding of the concepts and problems involved demands a hefty dose of training right from the start. All members of the team are then able to make a meaningful contribution.

Today, though, [illegible] software does exist to [illegible] the backbone of a system [illegible] comprehensive education programmes are available to [illegible] foundation of understanding and there is also a small band of professionals who have [illegible] through it before and [illegible] show the way [illegible] manufacturing [illegible] would [illegible]



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Established Cortez features include:

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Better results from the independents

By Roger Griffiths

The independent small software houses can sometimes give better results than in-house staff, says Roger Griffiths.

He points to the greater degree of continuity of effort and loyalty to a client and says that the in-depth knowledge of the independents is probably greater than users could normally hope to recruit for in-house work.

Roger Griffiths is the founder and managing director of consultants Duncan Branson Ltd.

THE independents are the small software houses — owned by themselves, owing nothing to any manufacturer, computer bureau or other large company. They may be one-man-bands, small partnerships or even large software houses in the making.

They exist not only because there is a demand for their services but also because they see a demand for that service in the foreseeable future. They are independent because they have been formed by data processing professionals who are prepared to be judged by the results they achieve and to be paid accordingly.

There are, of course, as with every profession, some free riders who are happy to cash in on what seems a cushy number. These are the ones who inevitably fall by the wayside once their effectiveness, or lack of it, has been judged by their clients. Unfortunately not all clients set as high a standard as the independents would wish. If higher standards were insisted on by installation management, many of the cowboys would be driven out.

This is more easily said than done however. Staff selection is always difficult at the best of times and plenty of time is needed to operate a full selection and interview procedure. External support is so often sought when time is at a premium and the pressure is on to get people in and the work done.

To a certain extent some of the independents are trying to police the profession by setting up their own organisations. The Association of Independent Computer Specialists (AICS) is one that, through its Code of Practice, attempts to maintain standards of performance and conduct. It is, after all, only if a credible service is offered that the independents will be invited in. There is one particular type of service that they are in the best position to supply — the personal service of a professional dedicated to one aspect of the business.

An individual independent computer specialist will be able to offer his specialist services to only one part of the market. It might be a fairly large part, such as IBM Cobol application programming or a small (but growing) part like the microcomputer business. What makes their service somewhat special is dedication to their work and to their clients' problems. At no time will a one-man-band business allow its standards to fall, since its very livelihood depends upon it.

Finding prospective clients and vice versa is the biggest problem — another good reason for joining an association capable of establishing two-way contact.

There has been a distinct change in the way that companies use external services. Originally, when a peak of work was experienced, the establishment was increased to cover it and more permanent staff hired if possible. With the subsequent and inevitable trough, either the establishment was reduced, or the general lack of work would result in the good ones leaving.

Many data processing managers now do not attempt to staff up for the peaks, but bring in external support, knowing that it is easy to dispense with at a later date. Under these circumstances there is a need to bring in people who are up to date in the latest equipment and techniques both for systems work and programming. Thus the independent computer specialists have to maintain a continuing education programme for themselves.

Recent developments with minis have probably brought the biggest single change to the support market for many years. Software houses have been of immense benefit to manufacturers, from the largest to the smallest, in installing their small systems in companies where there was no established data processing department. Such companies need the services normally of an experienced data processing professional who can see them through from start to finish and who will take a personal as well as a professional interest in ensuring a smooth-running operation. The smaller companies have an edge over their bigger brethren in this area.

This type of development is seen as a growth area for the support services market. Even when packaged software becomes available, people will still need to be helped during implementation, and later on as they grow. The continuing decline in the price of hardware means that the potential customer base will expand steadily.

Having described the types of service that are available through the independent software houses, it is worth taking a harder look at the data processing scene in general. As always, it is changing steadily, the biggest single influence at the moment being the introduction of the mini and its attendant distributed processing.

One of the benefits of the mini is that it makes it possible to do the processing where the work is, without sending it to the computer department. This line has been taken up so strongly that miniature computer departments are springing up all over the place in large companies, and so both large and small companies are calling on the services of the independents to help with installing their minis.

The latest development on the hardware scene is the microcomputer. Already the independents are moving strongly into this area, with some of the leading experts on the subject amongst the AICS membership.

With the growth of minis and micros, the hard-pressed data processing manager may very well find himself in an impossible position, with incompatible machines throughout his organisation. Those who have lost touch with computing technology may also find themselves in a difficult position. The independent, who is used to a life of high technology, high output and the ability to learn new techniques quickly, will be happy to offer his services to help sort out the problems.

Contrary to popular opinion, the independents can probably offer a greater degree of continuity of effort and loyalty to a client than his own in-house staff. It is one of the features of the computing scene that staff tend to move on after a few (sometimes a very few) years, in order to broaden their experience or perhaps just to find something to do when development work slows down. The independent is not only happy to move on when the pressure falls off, but is also available to offer assistance later when the work builds up again.

Many companies now find that by using the independents they can obtain the services of professional data processing staff with far greater knowledge and experience than they would normally expect to recruit from the market.

As long as the independent software houses maintain their standards, they will continue to play an important part in the software scene.

Fast growth of program products

● From page 13

ed, but "not this year", even though the advantages of immediate installation may be apparent. In these cases the enterprising buyer should try to come to an arrangement with the vendor whereby budgetary stress is avoided. Such an arrangement may be to negotiate an extended acceptance period at a "rental" charge within the buyer's immediate limits.

It must be remembered that the vendor is as anxious to install as is the buyer, and considerable pressure can be applied by a canny buyer to ensure that the right product can be obtained in the way desired. One possibility is that the chosen product is less than 100% satisfactory with regard to one particular feature which was established as a chief requirement during the feasibility study. It is worth remembering that although vendors may build red systems, and would rather sell red systems, they are sometimes prepared to colour them green.

As was said at the beginning of this article, the impact of program products is growing inevitably. The combined effects of economic viability and education will steadily accelerate that growth. Users must remember, however, that it is only by their own strict application of standards in the selection of such products that some of the disastrous experiences of the past will be avoided.

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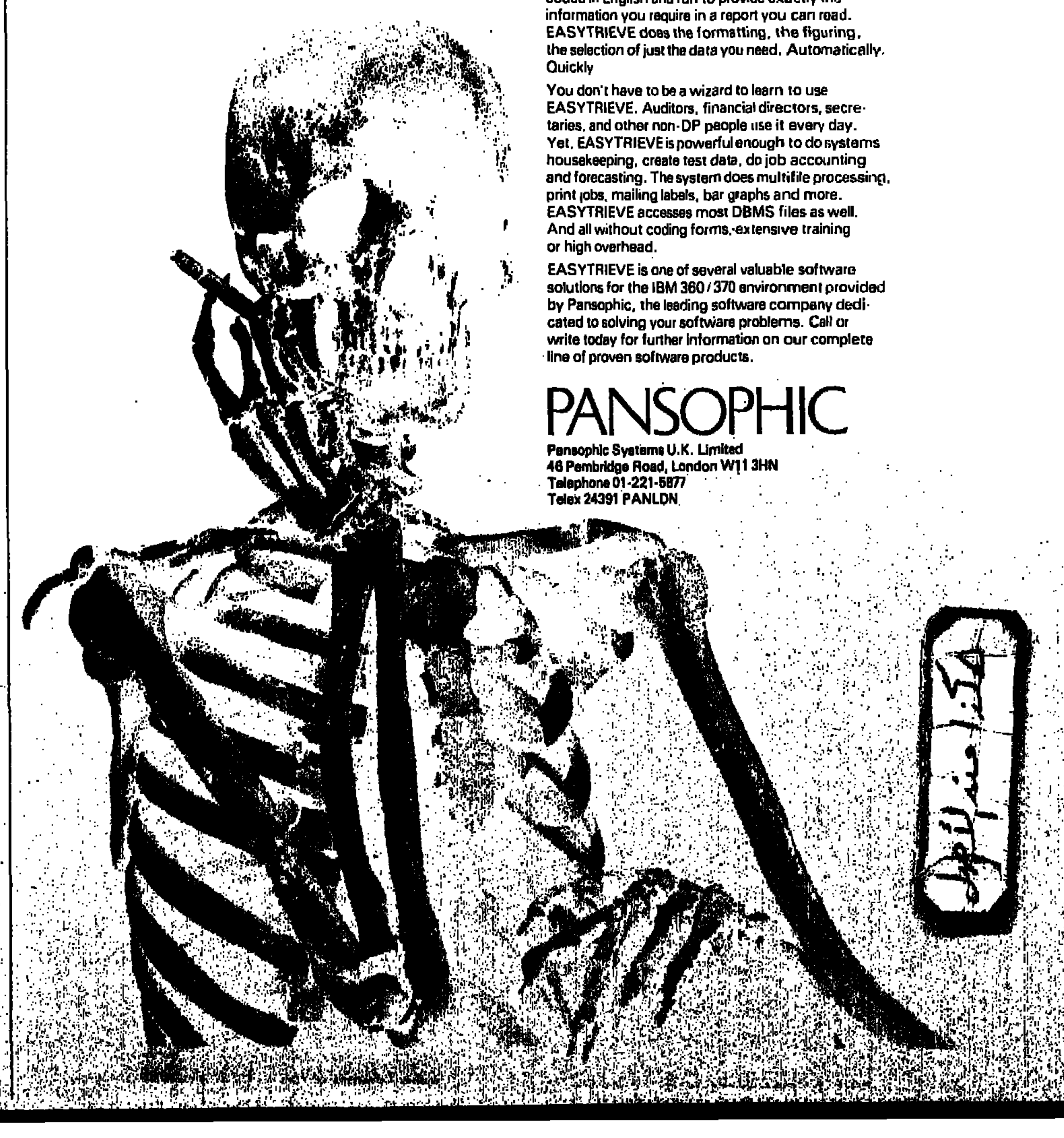

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Fairchild 9440 delayed

THE introduction of the 9440 16-bit microcomputer has been delayed until the end of the year by Fairchild to allow time for the company to assemble its own software package for the device.

The chip is the subject of a lawsuit filed by Data General in May concerning the misappropriation of trade secrets and violation of software licence agreements between the two companies (CW, May 12).

The new software currently being developed will include an assembler, loader, debugger, floppy disc operating system and business Basic. Fairchild has yet to file an answer to the Data General suit, and it is to be assumed that the new software may have some bearing on this.

Fairchild is planning to follow the introduction of the chip, early next year, with additional auxiliary memory and I/O control circuits. By the middle of the year, the company also expects to have a Fortran compiler available for the system.

Although volume prices are not yet available, single units will cost approximately $500 in the US.

The company has also made available samples of its version of the Advanced Micro Devices 2901A 4-bit slice processor, and will be introducing in the next year its own 8-bit slice processor manufactured in ECL for use with 16, 32 and 64 bit systems.

Tim Palmer visits Racal's Tewkesbury plant

Redac moves into business systems

AFTER several successful years selling computer-aided design systems, Racal-Redac of Tewkesbury, Gloucestershire, has diversified into business systems.

The company's new product, built around a Digital Equipment PDP-11/34 minicomputer and called the Redac Executive, was developed to provide a complete internal management information system at Redac.

It was originally developed using ICL's Prosper package and ran on Redac's 1904A. However, as the company increasingly specialised its software on DEC minis, it was decided to rewrite it to run under RSTS on the 11/34. Two new high-level languages, Forecast, which is similar to Prosper, and DRL for manipulating databases, have been developed, and the system was designed to be easily used by non-specialist staff.

Redac is typical of the kind of company Executive is aimed at. It has 120 people at Tewkesbury, working in several different research, development, assembly and marketing departments, and expects to make a profit of about £400,000 on turnover of £1.88 million in the year to April, 1978.

"The budgeted forecasts we made for the last two years using Executive were correct within 10%," says Redac managing director, Eric Wolfendale. "Using manual methods we did well to get the forecast within 40% of the actual figure."

The complete hardware-software system costs about £50,000, and is designed so that companies can write their own software.

Two systems have been sold so far, and in keeping with Racal's policy of exporting the bulk of its production, one has gone to a firm of tax accountants in Munich, which previously used a service bureau, while the other will be installed shortly for a group of accountants in Boston, Massachusetts.

At Redac, Eric Wolfendale uses the system to keep a close watch on all departmental expenditure. The system also handles all purchase orders, stock control, invoices and production control, and is used for allocating employees' time to each job.

All this is done on a surprisingly small system: a 48K-word processor backed with two 2.1 Megabyte disc cartridges supports four VDUs scattered through the building.

Extel cuts DECwriter price by over 20%

TIME SHARING users still holding large program libraries on paper tape are seen by Extel as a market for the paper tape ASR version of the 30 chps Digital Equipment DECwriter II printer terminal that it has just introduced.

Extel claims to be the only company in the UK that can both supply and maintain a DECwriter II with a paper tape reader/perforator unit.

At the same time Extel has announced a reduction of more than 20 per cent on the DECwriter II in KSR form, bringing the one-off price of the terminal down to £1,120. If cash is paid with the order the price is £1,095.

The new ASR version costs between £2,200 and £2,245, including the paper tape reader/perforator. This is built by Middlectron of Belper, Derbyshire, a small firm specialising in electro-mechanical DP equipment.

The DECwriter II with the paper tape unit provides the user with data preparation and editing facilities, in addition to the features of the DECwriter itself.

Griffiths blames cash flow for firm's failure

A CASH flow problem was a major reason for Griffiths Professional Services Ltd ceasing to trade at the end of August. A liquidator is to be appointed early next month.

Leonard Griffiths, founder and chairman of the group, told Computer Weekly that delay in the receipt of £30,000 for work done for an Algerian client had been the main cause of the trouble. He said the bank had not been able to continue to support the group despite the fact that income for October was expected to be about £100,000.

Griffiths also said that forward orders worth over £300,000 were on the books and he had considered the company to be in very healthy state.

The staff of 25, including those working for the group's main operating subsidiary, Leonard Griffiths and Associates, have left the company. Several are continuing to work on the projects with which they were involved on a freelance basis.

Indian dispute

A COMPROMISE is likely in the dispute between the Indian government and IBM (CWI, September 8). The Foreign Investment Committee has indicated that IBM will be permitted to form a new wholly-owned subsidiary to manufacture computers in India for export only, and to import computers permitted by the government. A condition is that IBM allows 60% Indian ownership in its present company which would then confine its business to running IBM service bureaux. IBM has already put forward a similar proposal.

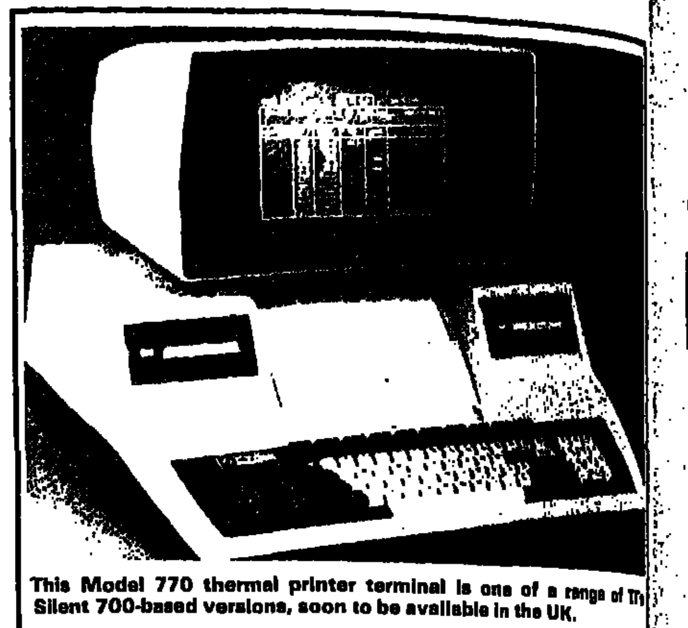
Govt agency orders 2976

ONE of the first UK orders for ICL's 2976 mainframe has come from the government's Central Computer Agency. The machine will replace a 1907 and 1904 run by the Central Computer Agency Computing Centre in Norwich both for the CCA and other government departments.

The 2976 was launched last year (CW, July 8) as a scientific machine incorporating the 2980 processor and the input and output controllers from the 2970. Glasgow University has also ordered one.

First product

A SINGLE platter disc drive with a 10 Megabyte capacity will be the first product to come out of the peripheral manufacturing plant being built by Digital Equipment at Colorado Springs. It will probably be called the RL01.



This Model 770 thermal printer terminal is one of a range of TI Silent 700-based versions, soon to be available in the UK.

Local processing on TI Silent 700

A VERSION of the Silent 700 thermal printer terminal with a 1920-character VDU and powerful local processing facilities, has been introduced by Texas Instruments. Called the Model 770, it will be available in the UK within the next two months along with two other new Silent 700 based products, the Models 763 and 765, both of which use bubble memory for data storage (CW, July 28).

TI has also announced a multi-copy impact matrix printer, the Model 810.

The Model 770 is configured around TI's TMS 9900 16-bit microprocessor which provides local data checking, validating and pre-processing in jobs like payroll, sales analysis, insurance claims processing and freight scheduling.

These jobs run under a multi-tasking executive held in ROM memory, and user programming can be carried out in Terminal Programming Language, TPL 700. TI says that this combines an English-like procedure language for data processing with a forms package for data entry.

Called TPL Forms, this is a "fill in the blank" language that provides the user with facilities like table look-up, conditional branching and field validation with fixed or user defined range sets.

The TPL 700 procedure language called, predictably, TPL 700 Procedure, includes character validation statements, arithmetic expressions and program loop structures and can be used to write programs that enable the operator to access files by name, for example.

Files are stored on a magnetic tape cartridge, and TI can supply the user with utilities to create copy, list and delete files, to display a catalogue of files and to initialise tapes. The 770 can have either 8K or 24K bytes of main memory. The 8K version costs £3,495 in quantities of 10.

The bubble memory used in the Models 765 and 763 is the IBM 0103 which has a higher access speed, less weight, a smaller size and lower power consumption than electro-mechanical devices like cassettes, paper tapes or floppy discs according to TI.

The quoted access time for any indexed record in memory is less than 15 milliseconds, a lot faster than floppy discs, but the overall data transfer rates are slower. If data is not indexed the character string search speed is 1,000 chps – four times faster than a cassette.

The portable Model 763 and the desk-top Model 765 can each have between 20K and 80K of bubble memory. With 20K, single quantity prices for the 763 and 765 are £2,195 and £2,395 respectively, and each 20K increment adds another £395 to the cost.

The Model 810 matrix printer is a 132-column bi-directional unit that runs at 150 chps and uses a microprocessor to maximise throughput. The 9 x 7 dot matrix print head can generate 64 ASCII characters.

The flexible package system that provides total accounting and financial management

That's a claim we're prepared to substantiate. The MMS General Ledger & Financial Reporting System is possibly the most advanced program package on the computer market.

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It has its own in-built data base. Completely flexible, for you to design your own chart of accounts.

It's designed to run on ICL 1900/2900, IBM 360/370, System 3 and certain UNIVAC and Honeywell models. Handling general ledger-like actuals, budgets, allocations, consolidations, multi-currency conversions and other applications such as vehicle and job costings.

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You must save on time. To design and implement such a system would tie up a high-level computer team for a considerable period. We can install in 3-6 months.

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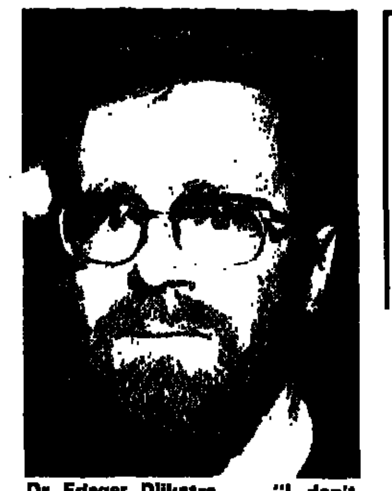
Shortcomings of the microprocessor from the point of view of the systems designer was the dominant theme of the 1977 Joint International Seminar on the Teaching of Computer Science. The annual seminar, sponsored by IBM and held as usual at Newcastle University, attracted some 60 participants from 14 different countries, the overwhelming majority being active in the university field. The overall subject of the seminar was Digital Systems Design.

How micros have changed the rules



Dr Edeger Dijkstra ... "I don't believe in pencil and paper."

THE extent to which the microprocessor distorts and transforms all the traditional dogma of systems design was brought home to the participants at the Newcastle seminar by Dr Ted Glaser of System Development Corp, Santa Monica, US.

"The microprocessor has forced a radical change in the class of systems which can now be built. Systems designers have been brought up with the idea of optimisation, but micros have changed the rules," said Dr Glaser.

"Things that were costly seven years ago are now cheap, but most machines are still designed on the basis that the CPU is the most expensive element, followed by the main memory, followed by everything else."

Dr Glaser gave an example of a project of System Development. "We build a variety of devices at SDC, and one of them, which uses an Intel 8080, recently ran into deep trouble.

"It was due for delivery on July 1, and we finally decided that we could get it out of the door on September 17. The only trouble was that it was September 17 of the wrong year.

"And the reason for the problems was simply that we had done the design using classic computer design approach, and were therefore multi-programming the 8080. But we only had to deliver five of these things.

"The solution was to change the approach and use three 8080s instead of one. Most of the time only one processor is running, but even so we saved more money on unused ROM than the cost of the two extra processors. And we managed to ship the systems before the end of July."

As examples of changes, Dr Glaser commented that 80 nanosecond cycle stack memory had proved cheaper than forecast, and was working now.

"Samples of 256K bit ROM will be available next May, and will cost about $30 each in volume.

"Within the last two weeks, I have discovered four new micros, two of them variations on existing ones, and two completely new.

"N-MOS technology products are now being sampled which run faster than anything that was predicted as ever being possible only two years ago."

The entire processor of the Univac 1108 could now be built on a single 8" by 10" board. It would run six times as fast as the 1108 and cost about $1,000, stated Dr Glaser.

Turn salesman into a programmer

THE problem of designing a programming system to meet the demands of a multitude of users, each wanting some unique features, was addressed by Professor Bill McKeeman of the University of California at Santa Cruz.

The solution he proposed is particularly appropriate to the problems presented by microprocessors, where programming often has to be done in a very low-level language in order to fit tight memory constraints.

Application programming systems so friendly that even a salesman can use them was the challenging title chosen by Professor McKeeman, and he illustrated his thesis with a case history.

A certain banking systems manufacturer of Kenton, Ohio, realised that he could replace much of the electromechanics of its automatic teller terminal by building in a minicomputer. It duly went ahead with the product, using the Computer Automation Alpha 16 mini. However, the constraints it placed on costs required that the operations be contained in 28K words of memory, and the only way to do this was to program in assembly language.

The first bank customers were delighted with the new system, but each demanded a few minor modifications, and with 30 systems installed and another 1,500 on order, the company realised that its programming costs threatened to run it into deep trouble.

Professor McKeeman was called in to find a solution. His answer was to turn the salesman into a "programmer."

"We advised them to write a specification processor to run on their in-house 370/168. Salesmen would take portable terminals around with them to customer sites, go through a checklist of facilities with the customer, and dial the customer's requirements into the mainframe over the terminal," said Professor McKeeman.

"This would result in a customer algorithm, which would be fed into a product simulator containing an interpreter for the algorithm. The features would then be demonstrated to the customer.

"On seeing the operation of the simulator, most customers would demand further modifications, but by going round the loop several times, a final customer specification could be produced. Feeding this into a contract writer would enable a customer contract to be written, the whole process being completed in a single day.

"The final step is to put a mini interpreter, device drivers and the customer algorithm into a program linker on the 168, and out comes the customer program, which can be transmitted direct to the terminal at the customer site over telephone lines."

Although Professor McKeeman considers both the Alpha 16 and the Intel 8080 to which the company intends to switch, as less than ideal for the approach, he believes it would succeeed.

"The initial cost would be high, but the approach would have several advantages beyond the saving of what could prove disastrously high custom programming costs," Professor McKeeman noted.

"In particular, salesmen would be restrained from over-enthusiastic marketing because they could only sell what was describable and acceptable by the specification program."

The things they said at the Newcastle seminar

"Anything designed today using latest technology is bound to be obsolete before the end of the life cycle of the product. We therefore have to design everything to accommodate new technology" — DR TED GLASER, System Development Corp.

"With the microprocessor, we are recreating the past, but in about three times real time. There was some hope that we might not make the same mistakes again, but we are just making them faster" — PROFESSOR BILL McKEEMAN, University of California.

"There are ten times as many people in the industry as there were the first time round; microprocessors have all the problems of previous processors and some new ones all their own" — DR TED GLASER, System Development Corp.

"Directed graphs can turn hardware into software and software into hardware: they provide designers with a better tool than pencil and paper" — PROFESSOR FRED HEATH, Heriot-Watt University, Edinburgh.

"Tools just get in the way of systems design: I don't believe in pencil and paper" — DR EDSGER DIJKSTRA, Burroughs Corp.

● Directed graph methods provide systems designers with a combination of pictorial and textual aids on a graphics screen, taking the design process one step beyond the flow-chart. One of the best-known directed graph projects is Logos, a joint development between Case Western Reserve and Heriot-Watt universities. It was developed on a Digital Equipment PDP-10 mainframe running under the Tenex operating system, at Case Western Reserve, Cleveland, Ohio.

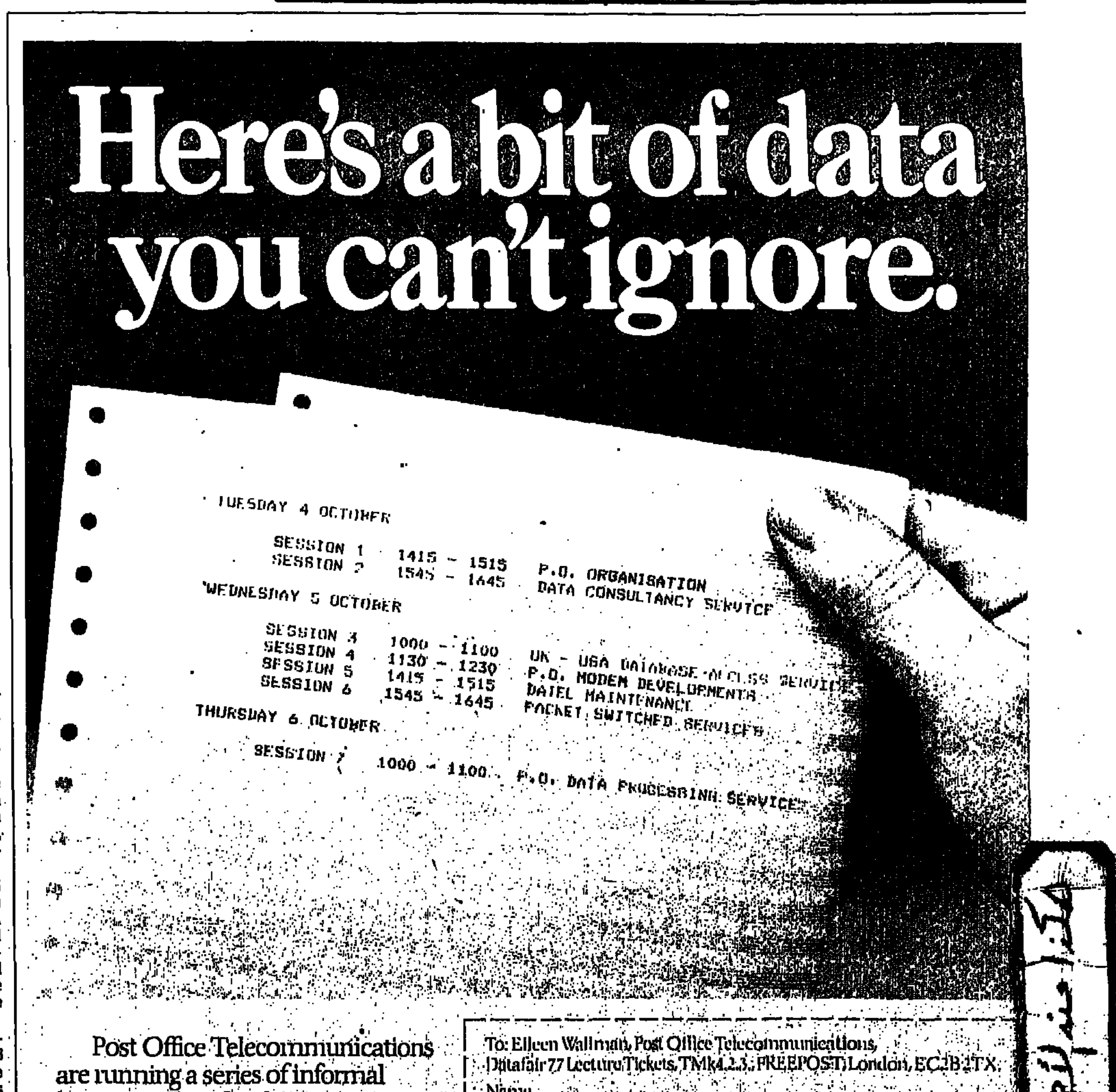
"We are getting into a lot of trouble with terminology. It has been suggested that we should change the names hardware and software, calling software hardware and hardware easyware." — DR TED GLASER, System Development Corp, Santa Monica.

"The rules of the game are changing constantly. If you were to design a desk-top computer four years ago, you had to use tape cassette as secondary storage. One year ago, it had to be a floppy disc. Today it has to be bubble memory. Next year it will be something else." — DR TED GLASER.

"If the Computer Board had to pay for all the systems it has installed, it would go bankrupt." — Anonymous member of the board responsible for acquiring computers for universities.

"Single chip processors like the F8 and the 8048 which give you 1K to 2K-bytes of ROM and 65 to 128 bytes of RAM plus one or two real time clocks, are better than Eniac and approaching Edsac and cost about $120. They're used in applications such as control of elevators ..." — DR TED GLASER.

"I wish you would tell me which elevator uses them so I can avoid riding in it." — DR EDSGER DIJKSTRA.



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LETTERS

Poor design a result of rush for marketplace

YOU purport to represent our profession of computer science and data processing. Yet, in your attack of Professor Dijkstra's recent comments on micros (Computerview, August 25), you condemn a widely held view and dangerously undermine the crucial position and principles of the profession.

One deplores the appallingly poor design of many microcomputers, rather than decries their cheapness and availability. The poor design seems to be the result of the headlong rush for the marketplace and the dominance of electronic engineers in the design teams. Little thought has been given to designing the order code to permit efficient compilation of high level languages or to the machine structure to encourage good protection environments for the operating systems and user programs, essential for software reliability. As professionals, we know now of the importance of these features and they are not unattainable with the prodigious quantities of logic now squeezed on to a chip.

The initial coding of a single program is a very small part of the cost of a useful software system. The dominant and important cost is that of obtaining correct software and maintaining it to be relevant in a changing environment. The enthusiasm of the individual may overcome the coding difficulties but it does not seem likely to tackle effectively the major problems of software engineering.

In the fifties a select band of enthusiasts wrote programs to solve individual problems. It was then blithely assumed that this approach could be scaled up with the advent of more computing power to attempt larger problems. The disastrous results of failed projects, inefficient systems and incredible delays in completion are well known. We are only just beginning to struggle out of the software quagmire into which that false assumption has led us.

If the DIY enthusiast threatens to disband or bypass the profession and run headlong into the same trap, then, with the increased dependence on computers, the eventual collapse can only be more disastrous, perhaps leading to the final catastrophe which stops the march of the micro!

We must therefore be sure to preserve the profession and encourage it to continue to struggle to understand and develop computing technology. The micro is not the panacea of computing. It does not avoid software problems and, in its present form, may create many more.

Dr MALCOLM ATKINSON
University of Cambridge
Computer Laboratory.

Dijkstra's contribution

THE attack on microprocessors by E. W. Dijkstra was labelled reactionary and protectionist by Computerview (CW, August 25). In fact, Dijkstra does not defend the DP profession but attacks those so-called professionals in DP who use poor design practices because they are unaware of the theoretical basis of computation. Dijkstra, Hoare *et al* have consistently worked to redress this balance. They were having some success (witness the growing interest in "structured programming" and "software engineering") *until* the advent of the microprocessor.

Because the early microprocessor manufacturers themselves had little or no experience in "advanced software", their products had neither the architecture nor the support (languages, etc) appropriate to the newer computational concepts. Their customers, in turn, used only the primitive software tools supplied with the device, thereby reflecting the software state-of-the-art of 25 years ago.

This in itself would not have been very damaging were it not for the mass production and hard sell essential for the commercial success of LSI technology.

Although the microprocessor admittedly lowers the cost of raw computing power, especially when in combination with other non-custom LSI devices like semiconductor memory, the product life cycle cost is not reduced in proportion. As the NATO software engineering conferences in 1968 and 1970 clearly demonstrated, the cost of software development and maintenance is highly affected by the design techniques and tools available to, or rather, imposed on, the programmer. (There is a similar commercial basis for the imposition of "good engineering practice" on the hardware designer.) This effect on product cost becomes relatively more significant as the computing device itself becomes cheaper. The microprocessor is certainly challenging and potentially beneficial, but it does not solve this problem.

That some members of Dijkstra's own profession seek to use his attack on the microprocessor as a protective shield for their own unprofessional practices is ironic but it must not be allowed to cloud his huge contribution to computing science. B. COHEN
St Albans

Qualification

YOU published my letter under the heading Doing Something for Operators (Letters July 7). In Op Spot (CW, August 25), there is a call for an acceptable qualification for operators. Until this arrives, my council is firmly convinced that the IDP Parts I/II examination (at ONC level) provides such a qualification for operators in the business environment, and with a back-up of two years' on-the-job experience holders of that examination certificate qualify as Licentiates (LIDP).

This provides a qualification in its own right for those who do not wish to go any further, although every incentive is provided for Licentiates to go on to the Parts III/IV examination (at HNC level) in order to qualify for full professional membership. Operators are certainly not regarded as second-class DP citizens by my Institute.

DEREK BRADLEY,
Secretary,
Institute of Data Processing.

In computers lies Frankenstein's monster....

THE article by Walter Goshawke on language translation by computer touched on a raw nerve (CW, September 1). While it would be foolish to state that such translation is impossible, I am quite certain that the time and expense which would be entailed in developing any realistic form of language translation would put it out of court.

I am one of those who regard such translation, therefore, in reality as being impossible. I do so on the basis of having spent the last 22 years in the computer systems and sales areas and, overlapping those, five years as a professional technical translator from German and French to English. I also speak some Spanish, Italian and Russian.

Let me take as a starting point the fact that language is both dynamic and personal. This means that it changes in idiom and shifts in its meaning both with technology advance and sociological and environmental change. As two simple examples, take the words "jeans" and "pop." Neither word would be in any but the most recent dictionary (dictionaries take donkey's years to prepare and publish).

By a language being "personal" is meant that each writer — or speaker for that matter — has his own turn of phrase, his own favourite expressions and, more importantly, his own favourite set of words (i.e., a personal vocabulary). Any translator will know that it takes two or three pages of script at least, before he really understands what the original author of the source language (say German) is trying to convey. The reason for such difficulty is that there are vast numbers of synonyms for many common words (and ... misuse of words, by "... standards" at least, ... common — that is ... shift in meaning or ...

For the translator to ... cessful he must understand ... the subject and the ... original author of the ... language thinks. He can ... only by "listening" to ... being written, by paying ... tion to the redundanc... expression which is ... for emphasis, clarity ... writer's/speaker's ... unconscious appreciation ... own shortcomings ... pression.

Try making proper ... for all that on a computer ... also the human or ... angle.

We all know how our ... ly bank manager" has ... ated into a computerised ... from the time his ... online to some ... despot. The same could ... with text processing ... current trend is ... and with computerised ... tion of language, ... became only half-... whatever that may ...

I am a strong bel... humanity. In computer... sense your contribu... Goshawke implies ... Frankenstein's monste... worse.

I suggest Mr Gosh... transfers or transla... energies to trying to ... better understanding ... peoples — which, after ... function which language ... can effect.

ROBERT T. ...
Woking, Surrey.

Courses for operators

I REFER to the article on courses for computer operators and would draw your attention to the Scottish National Certificate in Computer Operations sponsored by this Council and which has been available for several years now. It is offered meantime at 11 colleges of further education throughout Scotland.

This award, at ONC level, was introduced in the light of experience and in consultation with employers, to meet the needs of potential and trainee operators in industry, administration and commerce. It may be obtained after one year of full-time study or two years of part-time study and certain colleges offer the part-time course to ... needs of shift workers.

Successful completion ... course enables a s... continue his/her stu... Scottish Higher Nat... ficate or Scottish H... tional Diploma in C... Data Processing.

Full details of these ... be obtained by writ... Scottish Business ... Council, 22 Great ... Edinburgh EH3 6QE.

The Royal Society ... offers a certificate ... field.

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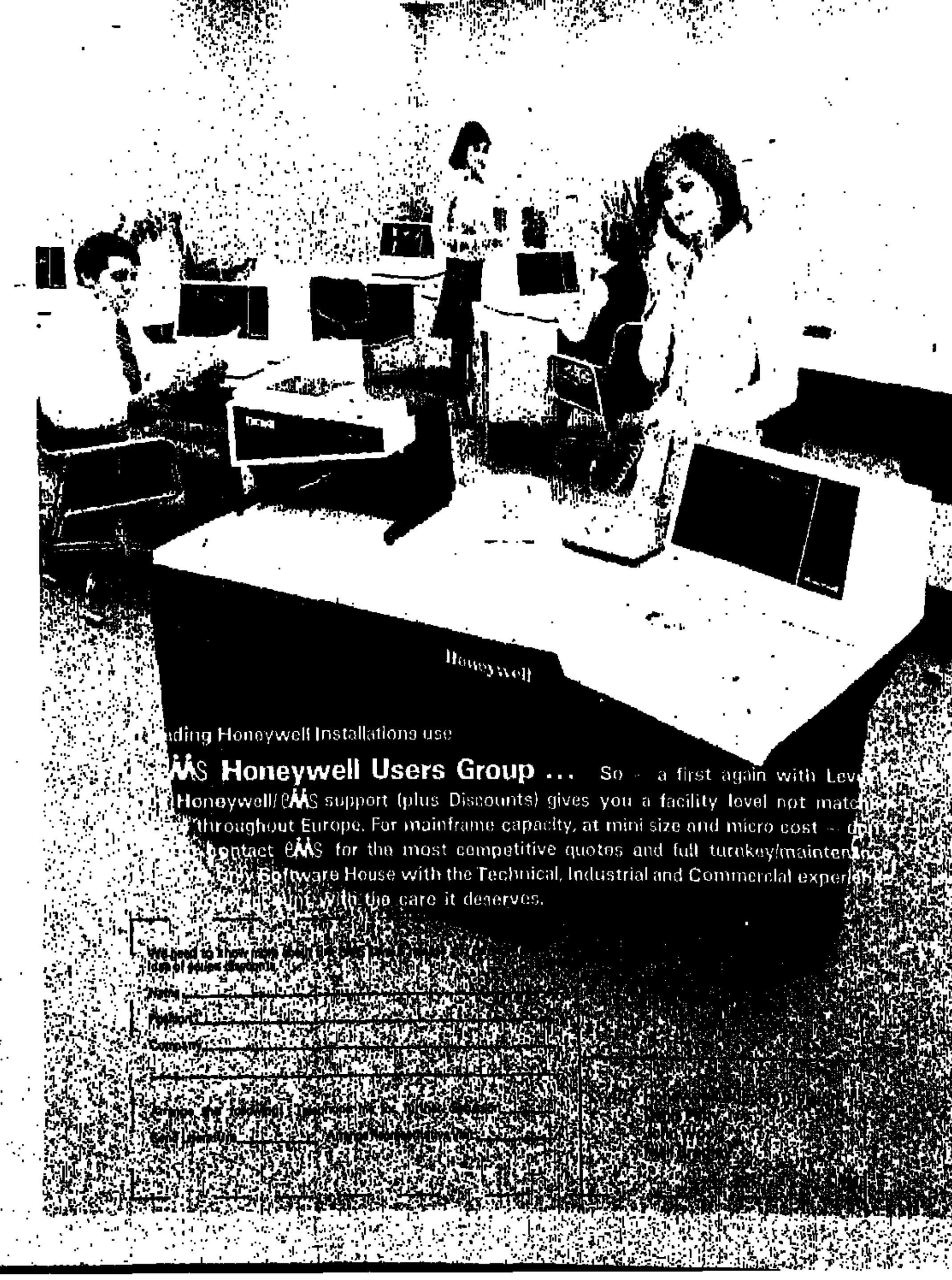

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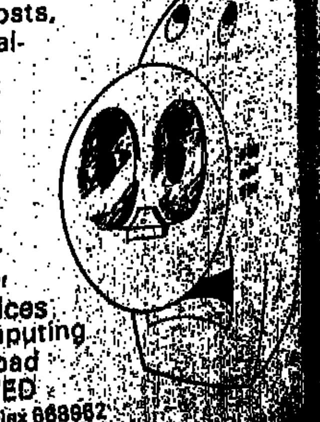

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For any organisation or company that makes or sells computers or computer equipment, or is involved in the computer services industry, one of the main preoccupations is the recruitment of suitably trained and qualified staff. To help fulfil this need specialist recruitment companies have grown to provide a wide range of services covering differing recruitment needs.

There is, for example, the first time user, setting up an installation from scratch, whose needs are quite different from those of an established computer manufacturer or software house, employing hundreds or thousands of computer staff. Also, the needs of organisations differ at different times. This article, based on a Briefing Note issued by the Computing Services Association, outlines the services offered by the recruitment agencies.

Solving the problems of recruitment

AN organisation may use a recruitment company if it:

- is a first time user and does not have the market knowledge or the expertise to do its own recruitment;
- does not have the resources necessary to cope with the work load involved in a recruiting drive, i.e. advertising, dealing with replies, interviewing, obtaining references, testing skills and so on;
- is based overseas, and while wishing to recruit in the UK has no offices in London and no real knowledge of the UK market;
- has advertised its vacancies, but has been unsuccessful;
- has a major recruitment need and wishes to supplement its own advertising;
- has advertised its vacancies, but has been is concerned at creating a bad image by further exposure;
- has a continual need for staff through expansion and needs access to all sources; or
- wants advice on salaries, organisation structure or its conditions of service in general, and so on.

The particular reason for deciding to use a recruitment company will dictate the type of service required, and this in turn will influence the choice of recruitment company.

The following range of services is available from recruitment companies, although not all companies provide all services.

Consultancy service. The recruitment company consultant visits the client, investigates his needs thoroughly, prepares a job specification, places advertisements and interviews suitable candidates. This results in a short list of suitable and interested candidates. Since candidates are fully briefed about the vacancy, there is usually a very high rate of acceptance.

The client pays for the advertising expenses incurred, the candidates' travelling expenses and an appointment fee, which is usually expressed as a percentage of the annual salary.

Under this arrangement, the consultant becomes ... involved with the ... and is committed to filling the vacancy. In return, the client normally does not pursue other avenues of recruitment. The consultant assumes the bulk of the work, leaving the client to carry out the final interviews and to come to a decision. A continuing relationship between consultant and client often develops to their mutual advantage.

Since the client is expected to pay for advertising under this arrangement, the costs in actual money terms can be higher. However, it must be remembered that the functions performed in any recruitment exercise cost money, whether they are carried out internally or whether they are done by external consultants. Since job specifications and advertisements must be prepared and advertisements published, the consultant approach does take time, and other methods of recruitment can be quicker.

One of the strengths of this approach is that it sets out to attract, through advertising, the best possible candidates who are available, not just those who happen to be registered with an agency. It can attract the candidate who is not dissatisfied with his present job, and such people are often of the best quality.

Agency service. The recruitment company consultant is given basic information about the vacancy and puts forward any candidates who seem suitable. He does not have detailed information about the vacancy and does not necessarily interview all applicants. If he has no candidates on file, he will be unable to help. Candidates put forward cannot be fully briefed on the job, and so may or may not accept any offer that is made.

Again, the appointment fee is usually related to the annual salary.

The essence of the agency service is that it gives clients access to the files of candidates who are actively looking for a new position. It is usual for a client to place his requirement with a number of recruitment companies to obtain the widest coverage. If no candidates are available, of course, the client must try other methods.

If suitable candidates are available and if they are interested in the job, an appointment can be made quickly. However, a lot of time can be wasted by clients seeing candidates who turn out to be unsuitable or not interested. If an appointment results, it is cheaper in money terms since the client is liable only for an appointment fee.

Register service. Other services offered include one where clients are sent, for a period, details of all candidates joining a register. No interviewing or pre-screening is provided, and the client pays a fixed fee whether or not any appointments result.

This service is the cheapest of all to clients, but can be frustrating because candidates whose details seem to be interesting turn out to be unavailable or not interested in the client. It is a useful adjunct to other methods of recruitment for organisations which have a large, continual and varied requirement for staff.

THE Computing Services Association's Recruitment Division comprises major recruitment companies in the UK which have satisfied the CSA that they meet three vital criteria:

- **they are well established, having been in business for at least two years, and are professionally managed**
- **they are financially sound**
- **they subscribe to a very strict Code of Conduct. This code is published by the CSA and is available from the association or from any recruitment firm member.**

The Directory of the CSA lists the companies in the Recruitment Division and each company has an entry setting out the particular services offered.

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PDP11 – FORTRAN or Assembler.
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Europe
IBM 370 OS PL1 programmers required for Geneva.
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For full details call Richard Kaluzynski, Mike Holden or Sue Gillam on 01-491 4706.

Knight Recruitment

Banking Systems
c.£8,000 West London
Are you a Systems Analyst with banking or data communications experience? Work for a major manufacturer on expanding financial product range. Ref. JP/149 **London**

Programmers
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Real variety in Central London
Real-time, on-line and batch systems; database development; distributed processing; COM; computer typesetting – that's the kind of variety of application waiting for young COBOL or FORTRAN programmers (with IBM or ICL experience) in our client's fast-growing DP department. The location is easy to get to, and the benefits package includes some unusual and very valuable features.
Ref. JP/0001 **London**

Senior Operator – multiprocessing
£3,870 Central London
An established but democratic (they operate a profit-sharing scheme) firm of consulting engineers with an international reputation is looking for a Senior Operator for a DEC System 10 operating on a three shift basis. You'll need three years experience on medium/large on-line systems – ideally DEC10 – and you must be familiar with multiprocessing systems. If you're ready for more responsibility, and the chance to use your initiative, this one's for you.
Ref. AM/0009 **London**

Frustrated Senior Ops
Lead a shift in Sussex on £3,500 plus shift allowance
With two years on 1900's preferably under GEORGE II you could join a major motor importer, attractively and accessibly located in Sussex. Benefits include car purchase scheme. Ref. AM/0008 **London**

Graduate to £10,000
in Paris and N. Africa
Computer manufacturer seeks French speaking computer science graduate to train as a systems engineer – trouble shooting on business and technical problems. High salary, tax concessions, travel, experience – what more could you possibly want in your first job? Ref. JP/152 **London**

Programmers for development work
up to £4,500 North Oxfordshire
Stable, highly successful engineering-based company is looking for young COBOL programmers to work on commercial applications, using a 1902T operating under GEORGE II. Ref. B/047 **Birmingham**

Program for the Professionals
c.£4,000 Birmingham and Manchester
Our client is known throughout Europe and the U.S. for products and systems that effectively solve the toughest business problems. The company's success has given a very healthy-looking future – a future you could share if you're a young COBOL/FORTRAN programmer with a lot to show for your three years experience. Ref. B/046 **Birmingham**

Analyst/Programmer, COBOL Programmer
£3,600-£5,000 Birmingham
The main attraction of these jobs – with a bureau whose principal customer is a large freight organisation – is the opportunity to build wide-ranging programming experience in a short space of time.
The COBOL Programmer will need 2–3 years COBOL experience; the Analyst/Programmer should have a commercial background. Ref. B/125 **Birmingham**

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Knight

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Midlands Recruitment,
Knight Computer Services Limited, Woodlands Road, Birmingham B8 3BD.

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LETTERS

Poor design a result of rush for marketplace

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Because the early microprocessor manufacturers themselves had little or no experience in "advanced software", their products had neither the architecture nor the support (languages, etc) appropriate to the newer computational concepts. Their customers, in turn, used only the primitive software tools supplied with the device, thereby reflecting the software state-of-the-art of 25 years ago.

This in itself would not have been very damaging were it not for the mass production and hard sell essential for the commercial success of LSI technology.

Although the microprocessor admittedly lowers the cost of raw computing power, especially when in combination with other non-custom LSI devices like semiconductor memory, the product life cycle cost is not reduced in proportion. As the NATO software engineering conferences in 1968 and 1970 clearly demonstrated, the cost of software development and maintenance is highly affected by the design techniques and tools available to, or rather, imposed on, the programmer. (There is a similar commercial basis for the imposition of "good engineering practice" on the hardware designer.) This effect on product cost becomes relatively more significant as the computing device itself becomes cheaper. The microprocessor is certainly challenging and potentially beneficial, but it does not solve this problem.

That some members of Dijkstra's own profession seek to use his attack on the microprocessor as a protective shield for their own unprofessional practices is ironic but it must not be allowed to cloud his huge contribution to computing science. **B. COHEN**
St Albans.

News Flash...

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Position
Company
Address
Telephone No. (including STD code)
Type of computer installed (if any)
Application
Send to: IMS, Honeywell House, Wharfedale Road, Bracknell, Berkshire RG12 1YA. Tel: Bracknell (0344) 424621

Courses for operators

I REFER to the article on courses for computer operators and would draw your attention to the Scottish National Certificate in Computer Operations sponsored by this Council and which has been available for several years now. It is offered meantime at 11 colleges of further education throughout Scotland.

This award, at ONC level, was introduced in the light of experience and in consultation with employers, to meet the needs of potential and trainee operators in industry, administration and commerce. It may be obtained after one year of full-time study or two years of part-time study and certain colleges offer the part-time course to meet needs of shift workers.

Successful completion of course enables a student to continue his/her studies for Scottish Higher National Certificate or Scottish Higher National Diploma in Computer Data Processing.

Full details of this course can be obtained by writing to the Scottish Business Education Council, 22 Great King Street, Edinburgh EH3 6QH.

The Royal Society of Arts also offers a certificate course in this field.

MISS A. M. REID
Assistant Chief Officer
Scottish Business Education Council.

Qualification

YOU published my letter under the heading Doing Something for Operators (Letters July 7). In Op Spot (CW, August 25), there is a call for an acceptable qualification for operators. Until this arrives, my council is firmly convinced that the IDP Parts I/II examination (at ONC level) provides such a qualification for operators in the business environment, and with a back-up of two years' on-the-job experience holders of that examination certificate qualify as Licentiates (LIDP).

This provides a qualification in its own right for those who do not wish to go any further, although every incentive is provided for Licentiates to go on to the Parts III/IV examination (at HNC level) in order to qualify for full professional membership. Operators are certainly not regarded as second-class DP citizens by my Institute.

DEREK BRADLEY,
Secretary,
Institute of Data Processing.

In computers lies Frankenstein's monster....

THE article by Walter Goshawke on language translation by computer touched on a raw nerve (CW, September 1). While it would be foolish to state that such translation is impossible, I am quite certain that the time and expense which would be entailed in developing any realistic form of language translation would put it out of court.

I am one of those who regard such translation, therefore, in reality as being impossible. I do so on the basis of having spent the last 22 years in the computer systems and sales areas and, overlapping those, five years as a professional technical translator from German and French to English. I also speak some Spanish, Italian and Russian.

Let me take as a starting point the fact that language is both dynamic and personal. This means that it changes in idiom and shifts in its meaning both with technology advance and sociological and environmental change. As two simple examples, take the words "jeans" and "pop." Neither word would be in any but the most recent dictionary (dictionaries take donkey's years to prepare and publish).

By a language being "personal" is meant that each writer — or speaker for that matter — has his own turn of phrase, his own favourite expressions and, more importantly, his own favourite set of words (i.e., a personal vocabulary). Any translator will know that it takes two or three pages of script at least, before he really understands what the original author of the source language (say German) is trying to convey. The reason for such difficulty is that there are vast numbers of synonyms for many common words (and others) and misuse of words, by "dictionary standards" at least, is very common — that is words on a shift in meaning or be shifted.

For this translator to be successful he must understand both the subject and the way the original author of the source language thinks. He can do this only by "listening" to what is being written, by paying attention to the redundancy of expression which is always used for emphasis, clarity or by the writer's/speakers's conscious or unconscious appreciation of his own shortcomings in self-expression.

Try making proper provision for all that on a computer! There also the human or ideological angle.

We all know how our "friendly bank manager" has degenerated into a computerised hall-of from the time his bank was online to some centralised despot. The same could happen with text processing if the current trend is any indication and with computerised translation of language, even if it became only half-successful — whatever that may mean.

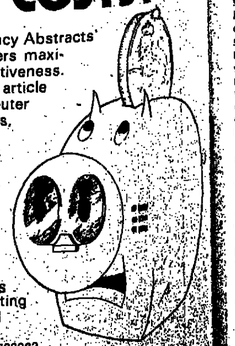
I am a strong believer in humanity. In computers, in the sense your contributor, Walter Goshawke implies, in Frankenstein's monster — or worse.

I suggest Mr Goshawke transfers or translates his energies to trying to promote better understanding between peoples — which, after all, is a function which language can effect.

ROBERT T. STOUT
Woking, Surrey.

ARE YOU WORRIED ABOUT COSTS?

'Installation Efficiency Abstracts' is aimed to help users maximise their cost effectiveness. It contains 200 article abstracts on computer performance, costs, optimisation, installation efficiency, computer acquisition and selection and can be scanned easily for articles of particular interest.



For further details contact:
Information Services
The National Computing Centre, Oxford Road
Manchester M1 7ED
Tel. 061-228 6333 Telex 668962

Appointments

LONDON: Derek Sherborne 01-261 8484 | MANCHESTER: Owen Kelly 061-872 4311 | BIRMINGHAM: Allen Baxter 021-356 4838 | GLASGOW: Owen Kelly 061-872 4311 | BRISTOL: Allen Baxter 021-356 4838 | LONDON: Steven Bellamy-Howells 01-261 8474 | MICHAEL WHITE Classified Advertisement Manager 01-261 8028/8688

For any organisation or company that makes or sells computers or computer equipment, or is involved in the computer services industry, one of the main preoccupations is the recruitment of suitably trained and qualified staff. To help fulfil this need specialist recruitment companies have grown to provide a wide range of services covering differing recruitment needs.

There is, for example, the first time user, setting up an installation from scratch, whose needs are quite different from those of an established computer manufacturer or software house, employing hundreds or thousands of computer staff. Also, the needs of organisations differ at different times. This article, based on a Briefing Note issued by the Computing Services Association, outlines the services offered by the recruitment agencies.

Solving the problems of recruitment

AN organisation may use a recruitment company if it:

- is a first time user and does not have the market knowledge or the expertise to do its own recruitment;
- does not have the resources necessary to cope with the work load involved in a recruiting drive, i.e. advertising, dealing with replies, interviewing, obtaining references, testing skills and so on;
- is based overseas, and while wishing to recruit in the UK has no offices in London and no real knowledge of the UK market;
- has advertised its vacancies, but has been unsuccessful;
- has a major recruitment need and wishes to supplement its own advertising;
- has advertised its vacancies, but has been is concerned at creating a bad image by further exposure;
- has a continual need for staff through expansion and needs access to all sources; or
- wants advice on salaries, organisation structure or its conditions of service in general, and so on.

The particular reason for deciding to use a recruitment company will dictate the type of service required, and this in turn will influence the choice of recruitment company.

The following range of services is available from recruitment companies, although not all companies provide all services.

Consultancy service. The recruitment company consultant visits the client, investigates his needs thoroughly, prepares a job specification, places advertisements and interviews suitable candidates. This results in a short list of suitable and interested candidates. Since candidates are fully briefed about the vacancy, there is usually a very high rate of acceptance.

The client pays for the advertising expenses incurred, the candidates' travelling expenses and an appointment fee, which is usually expressed as a percentage of the annual salary.

Under this arrangement, the consultant becomes deeply involved with the client and is committed to filling the vacancy. In return, the client normally does not pursue other avenues of recruitment. The consultant assumes the bulk of the work, leaving the client to carry out the final interviews and to come to a decision. A continuing relationship between consultant and client often develops to their mutual advantage.

Since the client is expected to pay for advertising under this arrangement, the costs in actual money terms can be higher. However, it must be remembered that the functions performed in any recruitment exercise cost money, whether they are carried out internally or whether they are done by external consultants. Since job specifications and advertisements must be prepared and advertisements published, the consultant approach does take time, and other methods of recruitment can be quicker.

One of the strengths of this approach is that it sets out to attract, through advertising, the best possible candidates who are available, not just those who happen to be registered with an agency. It can attract the candidate who is not dissatisfied with his present job, and such people are often of the best quality.

Agency service. The recruitment company consultant is given basic information about the vacancy and puts forward any candidates who seem suitable. He does not have detailed information about the vacancy and does not necessarily interview all applicants. If he has no candidates on file, he will be unable to help. Candidates put forward cannot be fully briefed on the job, and so may or may not accept any offer that is made.

Again, the appointment fee is usually related to the annual salary.

The essence of the agency service is that it gives clients access to the files of candidates who are actively looking for a new position. It is usual for a client to place his requirement with a number of recruitment companies to obtain the widest coverage. If no candidates are available, of course, the client must try other methods.

If suitable candidates are available and if they are interested in the job, an appointment can be made quickly. However, a lot of time can be wasted by clients seeing candidates who turn out to be unsuitable or not interested. If an appointment results, it is cheaper in money terms since the client is liable only for an appointment fee.

Register service. Other services offered include one where clients are sent, for a period, details of all candidates joining a register. No interviewing or pre-screening is provided, and the client pays a fixed fee whether or not any appointments result.

This service is the cheapest of all to clients, but can be frustrating because candidates whose details seem to be interesting turn out to be unavailable or not interested in the client. It is a useful adjunct to other methods of recruitment for organisations which have a large, continual and varied requirement for staff.

THE Computing Services Association's Recruitment Division comprises major recruitment companies in the UK which have satisfied the CSA that they meet three vital criteria:

- **they are well established, having been in business for at least two years, and are professionally managed**
- **they are financially sound**
- **they subscribe to a very strict Code of Conduct. This code is published by the CSA and is available from the association or from any recruitment firm member.**

The Directory of the CSA lists the companies in the Recruitment Division and each company has an entry setting out the particular services offered.

Datasolve Datasolve Datasolve

Knight Contracts

Could you use 500 operators?

That's the number of operators we've got on our books at the moment. When you consider that we won't take anyone with less than 2½ years experience, that's quite a team. So even if we picked you a team of Knight operators at random, you'd be sure of top calibre people. But we don't pick at random. Whether the job is for tomorrow or next month, regular or emergency, we make sure that every operator we send you has the right background for your type of hardware.

Sue Smyth, June Mogg and Jane Asbury will pick the operators you need. Call them now on 01-491 4706.

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Experienced programmers for the following contracts:

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IBM – 370 OS, PL1 BAL or COBOL. 370 DOS, BAL and COBOL. System 3 COBOL.
RPG11 – All Machines.
ICL – 1900 G11 COBOL.
Univac – 1110 Exec 8 COBOL.
Honeywell – Level 66 COBOL.
PDP11 – FORTRAN or Assembler.
Data General – Assembler or COBOL.

Europe

IBM 370 OS PL1 programmers required for Geneva.
Database expert – French speaking required for Paris.
IBM MVT systems programmer required for Italy.
For full details call Richard Kaluzynski, Mike Holden or Sue Gillam on 01-491 4706.

Knight Recruitment

Banking Systems
c.£8,000 West London
Are you a Systems Analyst with banking or data communications experience? Work for a major manufacturer on expanding financial product range.
Ref. JP/149 London

Programmers
c.£4,000-£5,000
Real variety in Central London
Real-time, on-line and batch systems; database development; distributed processing; COM; computer typesetting – that's the kind of variety of application waiting for young COBOL or FORTRAN programmers (with IBM or ICL experience) in our client's fast-growing DP department. The location is easy to get to, and the benefits package includes some unusual and very valuable features.
Ref. JP/0001 London

Senior Operator-multiprocessing
£3,870 Central London
An established but democratic (they operate a profit-sharing scheme) firm of consulting engineers with an international reputation is looking for a Senior Operator for a DEC System 10 operating on a three shift basis. You'll need three years experience on medium/large on-line systems – ideally DEC10 – and you must be familiar with multiprocessing systems. If you're ready for more responsibility, and the chance to use your initiative, this one's for you.
Ref. AM/0009 London

Frustrated Senior Ops
Lead a shift in Sussex on £3,500 plus shift allowance
With two years on 1900's preferably under GEORGE II you could join a major motor importer, attractively and accessibly located in Sussex. Benefits include car purchase scheme. **Ref. AM/0008 London**

Graduate to £10,000
in Paris and N. Africa
Computer manufacturer seeks French speaking computer science graduate to train as a systems engineer – trouble shooting on business and technical problems. High salary, tax concessions, travel, experience – what more could you possibly want in your first job! **Ref. JP/152 London**

Programmers for development work
up to £4,500 North Oxfordshire
Stable, highly successful engineering-based company is looking for young COBOL programmers to work on commercial applications, using a 1902T operating under GEORGE II. **Ref. B/047 Birmingham**

Program for the Professionals
c.£4,000 Birmingham and Manchester
Our client is known throughout Europe and the U.S. for products and systems that effectively solve the toughest business problems. The company's success has given a very healthy-looking future – a future you could share if you're a young COBOL/FORTRAN programmer with a lot to show for your three years experience. **Ref. B/046 Birmingham**

Analyst/Programmer, COBOL Programmer
£3,600-£5,000 Birmingham
The main attraction of these jobs – with a bureau whose principal customer is a large freight organisation – is the opportunity to build wide-ranging programming experience in a short space of time.
The COBOL Programmer will need 2-3 years' COBOL experience; the Analyst/Programmer should have a commercial background. **Ref. B/125 Birmingham**

01-491 4706
24-hour answer 'phone.
Knight Computer Services Limited, 14 Old Park Lane, London W1Y 4NL.

Knight

021-772 8331
Midlands Recruitment.
Knight Computer Services Limited, Woodlands Road, Birmingham B8 3BD.

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With a minimum of 3 years' DEC or similar experience including RSX11, knowledge of CORAL would be advantageous but not essential.

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Minimum 3 years' IBM 370 Series experience, sound knowledge of either BAL, PL/1 or CORAL, experience of IMS DB/DC would be an advantage.

These projects are based throughout the United Kingdom and Western Europe, so for further information about this scheme telephone, in confidence, to:

Miss Rachel Roberts
South Eastern Computer Services
South Eastern House
3/5 Old Bridge Street
Hampton Wick
Kingston-upon-Thames
Surrey KT1 4DB
01-977 5321 (Daytime);
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As a result of an expansion of our Hong Kong management consultancy practice there is an immediate need to strengthen the team in the management accountancy and data processing areas. We wish to hear from experienced management accountants and data processing personnel who can offer rounded practical experience in developing and implementing a wide range of costing and financial planning and control systems.

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Write in confidence, giving fullest details, including a recent photograph, to W. Parker (Ref. MC77).

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South London	c£190 p.w.	IBM & ICL COBOL
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For further details:
Telephone Les King up to 8 p.m. each evening or write to
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We specialise in D P recruitment for clients in Herts and North London and the following vacancies are taken from our current register

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One of the leading retail groups in U.K. known for its progressive management offers a dynamic but structured career in its ICL 1904S/VDU based computer division. Applications are invited from Analysts (UP to £5,200), Analyst/Programmers and Cobol Programmers, not necessarily ICL (Up to £4,862)

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The Authority is installing a dual Honeywell 66/10 at its Huntingdon Computer Centre, which will be linked via a network of over 70 terminals to 20 Divisional Offices.

A major programme of computer development, using Data Base Management and Telecommunications techniques, has now started and this offers an exciting opportunity for an experienced computer professional to be involved in a challenging period of development for a recently formed Computer Services Department

Systems Analyst
Business Systems Ref. RP31

Salary to £5,537

Applicants will initially be required to assist in the development of the Authority's Customer Service System for a consumer base of approximately 2.1 million properties. Subsequent development will include a fully integrated terminal based financial system.

In addition to a strong computing background, applicants should have experience of:

* Financial computer systems in large installations
* On-line applications and techniques
* Data-base concepts

All posts are located at Regional Headquarters in Huntingdon. Generous relocation expenses are payable in appropriate cases.

Application forms, returnable by 29th September, 1977, obtainable from:

Personnel Dept.
ANGLIAN WATER AUTHORITY
Diploma House, Grammar School Walk,
Huntingdon, Cambs. PE18 6NZ

LONDON BOROUGH OF LEWISHAM

TOWN CLERK AND
CHIEF EXECUTIVE'S DEPARTMENT

Senior Programmer
£5,494 - £5,797

The successful candidate for this position is expected to have had five years' programming experience, most of which must have been gained on IBM equipment. The main language used is ANS COBOL, but a working knowledge of BAL is expected. Teleprocessing experience would be an advantage.

The Borough's computer is situated in the Town Hall at Catford and comprises modern offices. Train and bus services are frequent and car parking is possible. Canteen facilities are provided.

The computer installation consists of an IBM 370/135 256K CPU (shortly to be upgraded to 384K. 3340 disks, 3410 tapes and other usual peripherals. It operates under DOS/VS and CICS/VS is being installed to cater for Olivetti TC800 terminal on-line cash receipting throughout the Borough.

Some of the projects under development or planned are Rating, Rent Accounting, Accountancy Procedures and Budgetary Control. Council library loan control and cataloguing using Plessey Light Pen Data Capture equipment, etc. Teleprocessing plays an important part in all developments.

Application form, returnable by September 30th and detailed job description, from Chief Personnel Officer, Town Hall, Catford, London SE6 4RU or telephone 01-690 7666 (24-hour Answone service), quoting: Reference CE276/CW and job title.

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£5,625-£7,375 plus car allowance

We require a qualified accountant or graduate of major responsibility will be the audit of the c computer operations and systems. The com comprises two IBM 370/145 processors op under OS/VS1. Whilst present applications comprise central batch processing as w increasingly developing interactive wo working. The Board has an annual turn £200m, and a staff approaching 5,000, in depots and shops throughout South Wales.

Applicants should ideally have both aud computer experience at a senior level who have been gained in industry. Public Service the Accountancy Profession or Computer However, further audit or computer training provided if necessary. The ability to liv constructively and communicate effectively levels is a basic requirement of the post.

The person appointed will be responsible to the Internal Auditor and will be based at our Headq which is situated in pleasant countryside Cardiff and Newport.

Conditions of service are those for administ staff in the Electricity Supply Industry and favourably with those available in other or tions.

Please send applications to The Secretary, South Wales Electricity Board, St. Mellons, Cardiff 9XW, marking the envelope "SWEB".

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CRL abacus, firmly established as one of the leading and most successful software companies in the country, now has over 120 people engaged on in-house and on-site work for many of the leading companies and organisations throughout the UK. In addition we have assignments in Europe based on our offices in Brussels as well as projects further afield.

From offices in London, Manchester and Coventry, we have achieved an annual UK turnover in excess of £1 million.

We have our own 2903 computer in Coventry, plus the facilities of an IBM 370 in London and the Midlands in association with another company in our group — CRL Bureau Services.

And all this has been achieved in a comparatively short space of time and in spite of the general economic situation.

Our reputation is high in the specific areas in which we operate — total project responsibility, project management, systems design, specialist programming, computer installation management and comprehensive small business systems services.

Our success has been made possible by sound management and financial control and, most important, by the professional and ambitious people who join us.

Now for our further expansion we need more of those people who feel as we do — that promotions should be made from within the company and considerable rewards be given. Also, for those who wish it, there is the opportunity to work overseas.

Our immediate need in London and Coventry is for

PL/1 programmers

Preferably with IMS experience who will enjoy the challenge and variety of a wide range of interesting, and sometimes unusual, projects, requiring the full use of your experience.

Systems designers and project leaders

Who certainly must have IMS experience and who have the personality and qualities to accept total responsibility for their projects. These are senior and important positions where you will have the opportunity to demonstrate management skills when working in close liaison with client staff and our own personnel.

benefits

Whilst we don't imagine you would join us simply for financial rewards, we do operate a very good benefits package — profit sharing scheme, pension and life assurance and BUPA. If you wish to relocate to **the Midlands**, we will provide assistance with relocation expenses, and housing is cheaper than in the South. Also, based in Coventry, you can enjoy the beautiful Warwickshire countryside and you are very well placed for fast trains to London and a network of motorways. **In London** you gain the advantage of our special Home-based Expenses Plan. And if you really know your job, **salary** will present no problem.

New SALES opportunity in Leeds

This is one of those ground floor opportunities where the right person can certainly achieve considerable success.

Because of our success in Yorkshire, we are opening an office in Leeds early in 1978, and we wish to appoint someone to handle all sales in this area.

Obviously, software sales experience is important and a knowledge of the local market would definitely be an advantage.

Target remuneration will certainly match your ambitions.

For this appointment, please write to the Managing Director, David Whitehead, in Coventry.

For opportunities in London & Coventry, please write to or ring:

Barbara Prior
58 Great Marlborough Street
London W1. Tel: 01-437 4083

Sue Benger
48 Queens Road
Coventry, CV1 3EH
Tel: 0203 21113

CRL abacus member of the Computer Resources Group

Computing Services Association

COMPUTER ENGINEERS

Mills Associates is a Nationwide Organisation operating 9 Computer Service Bureaux all utilising ICL 1900 equipment. The Company has always provided its own maintenance and in recent years has successfully extended this facility to a rapidly growing number of other 1900 users.

In its continued programme of expansion the Company is seeking additional engineers for the following areas:

South Wales **London** **Midlands**
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Candidates should ideally have experience of working on ICL 1900 equipment but other mainframe experience would also be considered.

An attractive salary is offered commensurate with experience together with a profit sharing scheme, standby and callout payments. A London allowance will be paid. Four weeks annual holiday. Company Car.

Candidates please write or telephone for an appointment.

J. S. Gould Esq.,
Mills Associates Limited
Wonastow Road
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For Microprocessor Applications in Telecommunications

S.E. England, up to £6,500 p.a.

Opportunities exist for experienced software designers to work on microprocessor controlled digital switching telecommunications systems. Graduates with several years software design experience should have worked on digital communications or real-time control systems. The U.K. Company is part of a major International Telecommunications Group and is currently involved in a variety of projects including the development of a system for European markets. A few vacancies also exist for Section Leaders.

Some travel may be involved including a short period in the United States. Excellent salaries and employment conditions exist and relocation assistance is available in appropriate cases.

Please reply to us quoting reference SS/AP16/CW/1273 on both envelope and letter. Men and women are invited to reply. Letters will be forwarded, unopened, to our Client. If there are any companies to which you do not wish your applications to be sent, please indicate this in a separate letter addressed to the Security Officer.

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Analyst Programmer
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Career prospects in this rapidly expanding company are excellent. Competitive salaries are offered, together with first-class staff benefits.

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Finance Department

COMPUTER PROGRAMMER

Grade AP2/4 £2529 to £3702 + supplement £312 if over 18 + Phase 2 supplement

Applications are invited for the above post within the Computer Division. The Borough uses a 96K ICL 1902T operating under OS + with 4 EDS 80 disk drives, 4 80 kch magnetic tape decks and communications equipment.

Due to an increasing workload — including several on-line applications, we are looking for a programmer with at least two years' COBOL experience (a knowledge of PLAN and DRIVER would be an advantage).

Starting salary according to experience.

Application forms may be obtained from the Personnel Officer, Town Hall West, Bromich, B70 8DX (021-569 2434)

Closing date 30th September 1977

DEVON

Information Processing Services require experienced contract programmers for current and future projects in the West Country. Regular payments at negotiable rates.

Write giving comprehensive career and experience details to:

Richard Stead
I.P.S.
Stokehill House
Crapstone
Yelverton, Devon

Senior Programmers
Analyst Programmers
Trainee Operators
CAMBRIDGE

Successful applicants for the above posts will be involved in developing systems for both on and off line point of sale equipment.
The group, with a turnover in excess of £36,000,000 is a leader in the implementation of up to the minute retail terminal systems.
The data processing department is equipped with a 96K Century 200 computer with tape/disc/cassette, a 32K Century 100 disc based computer, a Dataterm 3 document reader and NCR 7200 key to cassette equipment.
The department is situated in a modern office building with ample parking and subsidised canteen.
Good salary and conditions of work. Excellent superannuation scheme.

Apply giving brief details of age, past experience and qualifications to the Personnel Department
Cambridge & District Co-operative Society Limited
73 Burleigh Street
Cambridge CB1 1DW

co op

COMPUTER PROGRAMMERS

Two opportunities have arisen within our Data Processing Department.

Firstly we are seeking a programmer/analyst to join the one of COBOL to join our team working on a number of interesting projects. We are ICL 1900/2904 Users and have been operating our own on-line real time systems for a number of years.

The work is both interesting and challenging, and coupled with the benefits of working for a large company. If this interests you, come and have a chat about salary and conditions.

The team also requires a suitable 'A' level person to train as a programmer.

Please contact, in both instances, the Assistant Staff Manager, Personnel Department, Telephone Leicester 61551 Ext. 110.

The British United Shoe Machinery Company Limited
Leicester.

EUROPE'S LEADING SPECIALIST RECRUITMENT CONSULTANTS

SECTION LEADER : TECHNICAL WRITER

with a major Clearing Bank in the City **Starting salary c £5,000**

A MAJOR CLEARING BANK which operates internationally, and whose computer facilities are both wide-ranging and advanced, plans to establish an entirely new section whose objective will be to ensure that a high standard of technical documentation within the data processing function is maintained.

RESPONSIBILITIES

We are seeking a suitably experienced person to set up and head this new Technical Editing Section, whose primary functions will be as follows:

1) Producing technical documentation, with all that this entails, including liaison with DP and computer user staff and management.
2) Editing technical documents produced by other DP staff to ensure clarity of presentation and adherence to standards.
3) Advising on documentation techniques.
4) Making recommendations in connection with the further development of documentation standards.

REQUIRED PERSONAL PROFILE
Suitable candidates will fit the following profile:
1) Educated to at least A-Level standard.
2) Experienced in technical writing and/or editing in the Data Processing field.
3) Able to communicate effectively both verbally and in writing.
4) Having an intellectually critical and yet constructive approach to his or her work.
5) Having a mature personality.

THE APPOINTMENT IS PERMANENT AND PENSIONABLE, OFFERS ATTRACTIVE FRINGE BENEFITS AND GOOD SCOPE FOR FURTHER SALARY PROGRESSION.
PLEASE TELEPHONE FOR AN INFORMAL DISCUSSION OR SEND FULL CAREER AND PERSONAL DETAILS TO THE ADDRESS SHOWN.

Ref. CW911

DP SC **Crown House Morden London SM4 5EU**
consultancy division
01-540 8311
24-hour answering service

You can talk the hind legs off a donkey but...

...have you the ability to make an effective contribution in Digital's progressive Education and Training Department? Digital Equipment is the world leading mini-computer manufacturer. We have built our reputation on first class products and highly professional people, so it is only natural that we should treat training and educational services as a vital operation. It has played a crucial role in the organisation's success.

Right now we need people in the areas of Software Instructing, Hardware Instructing and in our Educational Development group.

SOFTWARE AND HARDWARE INSTRUCTORS

These are interesting and varied jobs which involve teaching DEC personnel and customers about DEC software or hardware products. Up to 50% of each course is spent in the lab with students making practical use of our 28 dedicated computer systems. Some, often specially tailored, courses are taught at customer sites. All these activities take up around 26 weeks each year, and when not teaching, our instructors are being trained, preparing courses, developing material etc.

Both Hardware and Software instructors should have sound experience as teachers, or in depth knowledge of computer hardware, electronic equipment, or software.

EDUCATIONAL OR EXPERIENCED COMPUTER PROFESSIONALS

The Educational Development Group uses specialist Computing and Educational skills to support DEC and our customers. This includes the research and developing of courses for new software products, investigating educational needs and providing training solutions on other special topics.

We need people who have had a college or university education and have at least 4 years in depth experience in one of the following areas: education and training, software, on-line, real time or data base systems, data communications or application system analysis and design.

Salaries for all the above positions are highly attractive and the fringe benefit package, including assistance with relocation where appropriate, is that to be expected from a progressive international organisation like Digital. There are excellent opportunities of career advancement, technically or in management, since we ensure that promotion is given to people with proven ability and ambition.

If you have the relevant experience for any of these positions, as well as a proven or potential ability to contribute in a teaching and training environment, then telephone Judi Maggs on 0734 583565 Ext. 3260 quoting ref. no. CW 319.

NB We wish to recruit people now and during the next few months, so contact us even if you are not interested in joining immediately.

digital

UNIVERSITY OF WARWICK
RESEARCH ASSOCIATE MOBILE ROBOT PROJECT

Applications are invited for a two-year appointment as Research Associate in the Department of Computer Science, available from 1st October, 1977 to work on a SRC funded project on the design, construction and operation of manipulator-carrying vehicles controlled by on-board computers. The project is concerned as much with engineering practicalities as with pure research into machine intelligence. Candidates should preferably possess a Doctorate in a relevant field, design and construction experience in computer technology and ability in applied mathematics; software ability and experience in light mechanical engineering, sonar systems or navigation technology could be an advantage. Salary on Research Range 1A (£3,333 x £216- £5,627 p.a.) point (depending on qualifications and experience. Further details can be obtained from Mr. M. H. Lercombe (Coventry 24011, ext. 2362). Application forms from the Academic Registrar, University of Warwick, Coventry CV4 7AL, quoting Ref. No. 5/R/77. Closing date for receipt of applications 7th October 1977.

The Polytechnic of North London
LONDON POLYTECHNICS COMPUTER UNIT
PROGRAMMER

To assist with the implementation of student record systems and other applications work. Applicants should be graduates or professionally qualified. Knowledge of Cobol essential, experience with Coleorge I an advantage. Salary on scale up to £6,684 (including London Weighting Allowance) plus 6% superannuation (limited to £6.8 per week), according to age and experience. Write for application form and further details to the Personnel Officer, LPCU, Polytechnic of North London, Holloway Road, London N7 8DB.

Field Service Engineers Wanted by Shh... you know who.

It's an open secret. The best opportunities for Service Engineers are at Data General. Let's prove it to you.

A few years ago, Bob Forrest, Dave Fooks and Ian Risk joined Data General as Field Service Engineers.

They haven't looked back since

Bob joined us as a Field Engineer in Manchester. He was soon promoted to Supervisor before becoming London District Field Service Manager. Within a year he was in charge of the UK Service Operation and has recently been promoted to European Technical Support Manager.

Ian joined us in the Southern Operation. Was appointed Engineer Supervisor for our major OEM inside 12 months. Eighteen months later he was in charge of Field Service for the whole of South East England.

Dave progressed rapidly too – but on the technical side. He became Senior Technical Support Engineer in the UK. Now he's one of the key international technical experts in the USA.

How did they achieve success?

Hard work naturally. But we helped them all the way. In the first year they were introduced to a whole new world. They were into state-of-the-art equipment. Our Eclipse, Nova, MicroNova and CS/40's . . . all being used for instrumentation and control, lab work, education and commercial applications . . . the fastest growing part of our business. We taught them the finer points of looking after our customers and seeing things from the customer's point-of-view. It was just the background they needed for success.

Why not you?

Last year we introduced a new product every 15 working days. With that and continuing success we need even more Field Service Engineers to join a national team that's quadrupled in 3 years.

Ian needs help in Southern District. Vacancies also exist in Leeds, Manchester, Birmingham, Bristol, Ireland and Scotland.

You'll be joining a company that offers plenty of opportunity because of our sheer growth rate.

You'll get an excellent starting salary.

And a Cortina L or car allowance.

So if you're a Field Engineer, Site Engineer or with a Service Organisation, contact Owen Wright on 01-578 9231 (reversing the charges if you wish).

Who knows? In a couple of years you could be in one of our ads!

Data General

Data General Limited, Westway House, 320 Ruislip Road East, Greenford, Middlesex, UB6 9BH

SYSTEMS MANAGER

TOY MANUFACTURER

LOCATION: NORTHAMPTON

SALARY: c.£6,500

Our client, the very successful British subsidiary of one of the world's leading toy manufacturers wishes to appoint a Systems Manager to have total control over their U.K. data processing function.

Currently this is handled by a VDU network on-line to a bureau but they plan to install their own Honeywell 61 in 1979. One of the prime responsibilities will be the planning of this implementation.

Naturally, the man or woman they seek for this position must have specific qualities and qualifications.

They must have drive, high technical competence, the resilience to see the job to its logical conclusion, deal personally with management and users — in fact, be able to meet the demands of being their No. 1 D.P. person with confidence and competence.

Audit experience or involvement in the design of system control is an essential requirement.

In this position the right person will obtain the invaluable experience that only results from working with a fast moving organisation.

Please contact Corinne Ingram quoting reference no. 742.

Computing Services Association

WE ARE ALWAYS INTERESTED IN HELPING YOU WITH YOUR CAREER
John Goldsmith (Computer Recruitment) Ltd., 15, Buckingham Palace Road, London, S.W.1.
Tel: 01-828 5356—24 hour answerphone service.

JOHN GOLDSMITH (Computer Recruitment) Ltd.

JBA

Sales Executives

London and Home Counties **c.£10,000+ on quota plus car**

A highly successful computer manufacturer is expanding its sales team to cope with the demand and is looking for professional Sales Executives.

Applicants should have at least five years in the computer industry with the latter ones spent in a sales environment. Preference will be given to candidates who can demonstrate a proven record in minicomputer or software services sales.

This is an exceptional opportunity to grow with an expanding organisation.

Excellent basic salaries plus fringe benefits.

Contact: Jim Baker

Project Leaders

Herts **Neg £6500**

This is an opportunity to broaden the scope of your responsibilities working for a highly successful computer manufacturer engaged on the design and development of special products to meet specific requirements for their customers. To qualify for these challenging positions, you will be able to demonstrate a good technical background coupled with proven ability to take projects from inception to implementation. Suitable candidates may be of a hardware or software background, with high degrees of self discipline and initiative. If you feel able to make a significant contribution in this expanding group, then this is an outstanding opportunity to gain invaluable experience at the full front of technology.

Excellent salaries and relocation expenses.

Contact: Margaret Stevens

Minicomputer Programmers

Berks and London **up to £5500**

Our client, a large well-established company, has opportunities for programmers to work on the development of minicomputer applications.

Candidates must have at least twelve months' experience of Assembler on small machines, such as PDP11, NOVA, SINGER 10, etc.

Excellent opportunities and salaries.

Contact: Jim Baker

Programmers and Analysts

N.W. England **up to £5500**

Our client, a major U.K. company, has requirements for programmers and systems analysts to continue the development of some of the most sophisticated commercial systems in Europe.

Candidates for the programmer and senior programmer positions must have at least one year's programming experience using COBOL, preferably in a real-time environment. Systems staff should have a minimum of four years in data processing, this should include two years' designing commercial applications.

The company offers challenge and variety, coupled with security and excellent prospects. Salaries negotiable according to experience. Relocation assistance is available.

Contact: Margaret Stevens

C.A.D. Programmers

Herts (near A1) **up to £5000**

Our client is engaged in advanced work using Computer Aided Design techniques incorporating a wide range of sophisticated equipment. Processing is carried out on a large minicomputer linked to an ICL mainframe. Programming is in FORTRAN and several other special languages (training will be given).

This is an excellent prospect for scientific-minded programmers who want to progress in a high technology industry.

Salaries negotiable according to experience.

Contact: Mike Creamer

COBOL Programmer

London **£neg.**

At least six months experience of COBOL is the minimum requirement for this absorbing conversion project. Knowledge of NCR Century series and NEAT-3 would be a definite advantage. Would suit junior programmers who wish to broaden their experience.

Salary according to age and experience.

Contact: Mike Creamer

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES
International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

Do you speak a COmmon Business Oriented Language?

Identification

This Division leads the world in the applications of advanced gas turbine technology to industrial and marine uses. With a current order book of over £130,000,000, we are looking to still further expansion. Naturally, this will also involve an expansion in our Data Processing Department. Which may be where you come in.

Environment

Ideal. You'll be among people who speak your language. COBOL, principally—but if you're familiar with DMS2 and the ICL1900 NIMMS package, that will be helpful too.

Data

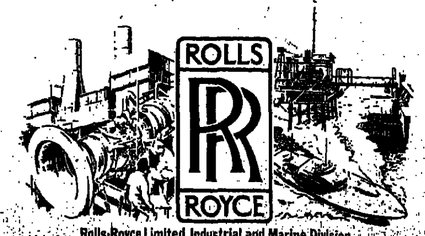
The people we're looking for currently are PROGRAMMERS

Ideally, with the experience—or capability—of systems design and supervision, and the ability to generate new ideas. A good educational background is essential either to Graduate, HNC or appropriate 'A' levels standard. **We want top programmers and the people who want to become top programmers.**

Procedure

If you'd like to join a lively, imaginative team who have set up a fully integrated information system—and work in pleasant surroundings—the procedure is very simple.

Phone for an application form, or apply in writing to Mrs. K. Brown, Personnel Department, Rolls-Royce Limited, Industrial and Marine Division, P.O. Box 72, Ansty, Coventry, CV7 9JR. Tel: Coventry (STD 0203) 613211 Ext. 60



Rolls-Royce Limited, Industrial and Marine Division

SYSTEMS ANALYST

c. £5,500 per annum

Hedges & Butler is the wholly-owned wines and spirits subsidiary of Bass Charrington and is responsible for distributing a wide range of leading brands.

The company has acquired a Honeywell 64/20 to which all current applications are being transferred, and as a result we are enlarging our development team.

We are seeking an experienced Systems Analyst who will be engaged on major stock control and accounting applications for the Company.

Applicants should have a good educational background with at least three years' experience as a Systems Analyst. The job requires the ability to work effectively with both senior management and technical staff.

Conditions of employment are in line with those of a progressive organisation and include Pension and Life Assurance Scheme, free lunches, 4 weeks annual holiday, and staff discount scheme.

Please telephone or write for an application form to: Miss J. Long, Personnel Officer, Hedges & Butler Limited, Three Mill Lane, Bromley-by-Bow, London E3 3DU. (Telephone 01-980 7133.)

HEDGES & BUTLER LTD.

A BASS CHARRINGTON GROUP COMPANY

THE BRITISH COUNCIL

SYSTEMS ANALYST/ PROGRAMMER

The British Council invites applications from suitably qualified men and women for a post in its Data Processing Department. The successful candidate will join the systems design team which is currently engaged in the development of new systems, but must be prepared to work on the maintenance and improvement of systems already in operation.

Candidates must have approximately three years' ICL COBOL programming experience on 1900 computers and the ability to work with minimal supervision. Familiarity with GEORGE 3 and paper tape input would also be useful qualifications.

The salary, including London Weighting and pay supplements, ranges from £4,887 to £5,967, 22 days' annual leave.

For further particulars and an application form, to be returned by 10 October, telephone or write, quoting G/S, to: Staff Recruitment Department, The British Council, 65 Davies Street, London W1Y 2AA. Telephone 01-499 8811 (ext 304).

SYSTEMS ANALYSTS

FELTHAM: 2 yrs. exp Finance/Stock, pref. to £5,800
N. SURREY: for Commercial projects — Ips. Machine to £6,200.
MID-SURREY: Grads, Defence Systems, to £6,000.
SOUTHAMPTON: Project Management/Factory Systems to £6,000.
N.W. SURREY: for Financial/Marketing applications to £5,600.
GUILDFORD: for Accounting/Commercial Systems to £4,000

ANALYST/PROGRAMMERS

CROYDON: IBM System 3. Min 1 yrs. exp. to £4,800.
MITCHAM. 3 yrs. IBM COBOL Programming, to £4,400
H. WYCOMBE: Suit Programmer — any language, to £4,400
HAYES: 2 yrs. Programming for IBM/H'well, to £4,000

PROGRAMMERS

N. SURREY: Progs/Designers — Good exp. to £6,200
N.W. LONDON: Good exp'— any language, to £5,500
CRAWLEY. ASSEMBLER/ALGOL/CORAL to £5,300
N.W. SURREY: Good COBOL experience, to £5,000
MID-SURREY. COBOL/ASSEMBLER, to £5,000
ALPERTON: Min. 1 yr. COBOL, to £4,000

We have further vacancies throughout London and the Home Counties Please phone for an Application Form.

AMES PERSONNEL
TELEPHONE 01-767 0611

NORTH WEST

MINI COMPUTER SALES

Quota earnings 10K + car (Base salary 5K)

Our clients manufacture a highly competitive range of commercial mini computer systems that are fully supported by comprehensive software and engineering facilities, and growing acceptance of their products in the market place has led to an expansion of their sales force in the North West.

They are therefore seeking candidates who will be able to demonstrate a successful track record in selling small computer systems, VRCs, accounting machines or bureau services to the first time user market.

Our clients offer a high basic salary, two litre company car and the security of working for an established and well funded company.

Contact: TONY DEAN on 061-833 0676. Ref. 77/09/14

MIDLANDS

BUREAU SALES EXECUTIVE (TIMESHARING SYSTEMS)

Base 4/5K + quota bonus to 9K + and company car

Our client is a market leader in network services, the fastest growing sector of the computer services industry.
The company's reputation, product line and growth plans are excellent and it is well established with a Birmingham branch operation.
For a prime West Midlands territory, we are retained to recruit an experienced sales professional.

Candidates should have:
- ★ Experience of the time-sharing, bureau sales or business systems markets in a direct sales capacity.
- ★ A definite sales personality to accompany a strong track record in selling.
- ★ Aged 25/40.

This is the first opening with our established client in its Midlands operation, and affords an excellent opportunity for real career growth in both financial and responsibility terms.
Contact: PETER RIGBY on 021-236-3781. Ref. 77/09/15.

SCR

SPECIALIST COMPUTER RECRUITMENT LTD.
BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR
MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD
LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102 Blandford Street, London W1E 1JZ

Computing Services Association

COMPUTER OPERATIONS MANAGER
TEHRAN

A major Iranian industrial group needs an Operations Manager for its IBM 370/125 installation in Tehran.

Reporting to the DP Manager, you will be responsible for the efficient operation of the computer and peripheral equipment, including scheduling, work planning and liaison with user departments. You must be familiar with the IBM 360/370 range and have gained your experience at Operations Manager level in a manufacturing company.

Benefits include the provision of housing, a company car and substantial help with educational and medical costs.

Please write, giving details of qualifications, experience and current salary level and quoting Ref. 114, to:

Mr. A. Cook, Grafton House,
PO Box 214, London NW3 7DH.

CONTRACT OPERATORS
UK & EUROPE
Phone Pat Eagling
01-402 9355
MARCOL COMPUTER SERVICES LTD.

MARCOL is an associate company of the Norwich Union

The Polytechnic of North London

LONDON POLYTECHNICS COMPUTER UNIT

COMPUTER OPERATOR

The hardware:
ICL 1903E (96K) with discs and magnetic tape, cards and paper tape, graph plotter, 7028s and interactive terminals.

Operating systems:
George 3 (+ some George 2)

Shifts:
Monday-Friday, 24-hour working most of the year.

Qualifications:
1900 experience preferred but training would be considered for suitable applicants, including school leavers.

Salary:
On scale up to £3388 (including London Weighting Allowance) plus 5% earnings supplement (limited to £4.00 per week) and shift allowance. Commencing salary according to age and experience.

Further details and application form from Head of LPCU, Polytechnic of North London, Holloway Road, N7 8DB.

PROGRAMMER
Public Health Laboratory Service

A programmer is required for a small team engaged upon a pilot project for the storage, retrieval and analysis of information for Microbiological laboratories. The work of the department is to be expanded and the programmer will be expected to assist in the development of the existing systems, the introduction of systems to other laboratories and new projects as they arise. Knowledge of PLAN, COBOL and NCC TABN is desirable together with experience of GEO III operations on ICL 1900 series. A knowledge of ICL 2903 operations could be useful.

Salary in the scale (Senior Admin Nhs) of £4408-£5218 which includes London Weighting and pay supplements. NHS Terms and Conditions of Service. For further details and application form apply Mrs D. J. Davies, Personnel Officer, Central Public Health Laboratory, Colindale Avenue, London NW9 5HT.

DATA PROCESSING
SAUDI ARABIA

Whittaker Life Sciences Group is operating a Health Services Project for the Saudi Arabian Government which includes hospitals in Jeddah, Tabuk and Khamis Mushayt. Due to the expansion of the project and the resulting requirements for additional computer systems, vacancies have recently arisen in the Jeddah Data Centre for:

Systems Analyst — To £10,370 (U.S. $18,000) P.A. Tax Free
A minimum of two years experience in systems plus two years programming is required. Practical experience of IBM 360 or 370 under DOS is essential and some knowledge of RPG II or BAL would be useful. The work will be initially on Supply, Finance and Employee-related systems.

RPG II Programmers — To £8,070 (U.S. $14,000) P.A. Tax Free
A minimum of two years programming experience is required using RPG II on IBM equipment. Knowledge of DOS/VS POWER is desirable and some experience with another programming language would be considered an advantage.

Data Entry Operator — To £5,180 (U.S. $9,000) P.A. Tax Free
A minimum of two years experience and speeds of at least 10,000 depressions per hour required. Experience with IBM 3742's would be an advantage but training will be given if necessary.

The initial contract is for a two-year period and applicants must be single, or married with no children. The contract includes free accommodation, six weeks vacation each year, free medical care and a contract completion bonus of one month's salary.

The successful candidates will have the opportunity to save a considerable sum of money, whilst enjoying the outdoor activities in the sunny climate of a stable Middle Eastern country.

For further information and an application form, contact:
Whittaker Life Sciences Ltd.,
76 Grosvenor Street, London W1. Telephone 01-499 4395.

Whittaker Life Sciences Ltd.

PROGRAMMERS

Small alert System House in North Surrey/London require programmers for lively commercial projects. £4,000-£5,500 depending on experience. **01-398 7346.**

CAPITAL APPTS. — 34 Percy St. — London W1A

FORTRAN
Programmers urgently required for Industrial and Scientific development.
£3,500-£6,000
ALL AREAS
Phone for free list of vacancies
637 3551 day; 965 0463 eve.

ACCOUNT EXECUTIVE
CUSTOMER SERVICES OFFICER

Baric is one of Britain's leading bureaux, owned jointly by ICL and Barclays Bank.

Because our distributed data processing business is growing fast we need to recruit Systems Support Engineers who are looking for a job that gives variety and real growth potential.

In particular our Key Accounts area is looking for two Executives who will be closely involved with its POST OFFICE account. This is one of Baric's biggest customers using a large terminal network based on a 1904S/7905 configuration at Feltham for work associated with the development of an automatic telephone exchange:-

SENIOR ACCOUNT EXECUTIVE — **Circa £7,500**

To handle the POST OFFICE account you should be able to demonstrate:-

- a good understanding of 2900, 1900, George 3, and communication systems.
- a well developed commercial realism.
- an ability to communicate with people at a variety of levels – Technician, Layman, Manager.

Experience of project management is desirable, but not essential. In addition to the responsibility for the POST OFFICE account you will be required to provide sales support for bids involving 2900 and communications systems.

The post is commission earning, which at 100% achievement equals half basic salary.

CUSTOMER SERVICE OFFICER: — **Circa £5,000**

To provide day to day support for the POST OFFICE, and other inter-active and distributed processing customers. You should be able to demonstrate:-

- a good understanding of the ICL 1900 George 3 operating system, and related communications systems.
- an ability to recommend, and effectively communicate solutions for the customers operational requirements.
- an ability to organise, and monitor the George 3 systems usage.
- an ability to provide technical sales and installation support, specifying terminals, modems, and lines.

Applications should be sent to:-
P. Strode, Area Personnel Officer, Baric Computing Services Limited, Forest Road, Feltham, Middx. Telephone: 01-890 1414

BARIC

AN ICL/BARCLAYS BANK COMPANY

Leicester Polytechnic
COMPUTER CENTRE
(User Support Group)

INFORMATION & ADVISORY OFFICER
£4239-£4545 plus pay supplements of up to £520 p.a.
This is a senior post concerned with leading the full range of information services available to users of the Centre, involving documentation, training and advisory functions. Applicants should preferably hold a degree or similar and have appropriate experience.

APPLICATIONS PROGRAMMER
£2828-£3282 plus pay supplements of between £484-£462 p.a.
This post involves a wide range of applications arising from the different faculties of the Polytechnic. Previous experience an advantage but recently qualified graduates or similar will be considered.

Further details and application forms available from Staffing Officer, Leicester Polytechnic, P.O. Box 143, Leicester, LE1 9BH. Tel. Leics. 50181, Ext. 2301. Closing date 30.9.77.

IMPORTANT REMINDER

Make sure you don't miss our issue of September 22, which will highlight the opportunities currently available in Wales and the West Country. To advertise in this important feature contact:

Alan Escott on 021-356 4838
or
Mark Williams on 01-261 5810

Computer Appointments Register

SENIOR COMPILER DESIGNER
Reading, Berkshire

An established software engineering group of a leading computer manufacturer requires a senior compiler designer to join a small group producing a compiler for a high level real-time language.

The successful applicant will have a proven record of design and implementation of compilers for Algol, PL1 or similar languages, and is unlikely to be earning currently less than £6000 p.a.

This is a unique opportunity to join a small, open team working at the forefront of software technology.

Interested? Contact Geoff Mackenzie on 01-439 6299.

Computer Appointments Register

NORTH WEST LONDON AMBITIOUS PROGRAMMERS HONEYWELL 2030A UP TO £5,000

Our client is part of a multi-national American food group playing a major role in the production of human and pet foods. They have a current requirement for Cobol Programmers with at least 9 months' experience in a commercial environment — successful applicants will be involved in order entry, sales statistics and costing system applications. A knowledge of Fortran, although not essential, would be of use as a Honeywell TN 300 GE MK III using specialised interactive systems (via satellite) is periodically used.

Successful applicants will be provided with every opportunity to work autonomously and will be engaged on user requests at programming level.

Attractive staff benefits exist including a subsidised restaurant and staff shop, a pension and life insurance plan and a bonus scheme.

If you wish to work for a company offering valuable experience and prospects for advancement, together with highly competitive salaries, then contact Terry Manning on 01-439 6299 quoting ref: TM 881.

Computer Appointments Register

PDP 11/45 UNITED STATES

If you have four years or more experience on flight systems design or engine systems design and would like 6 to 8 months in the U.S.A. followed by a career based in England, telephone Geoff Mackenzie on 01-439 6299.

Computer Appointments Register

Regent House, 54-62 Regent Street, London W1A 4YJ. Tel: 01 439 6299 — a member of The Federation of Personnel Services

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TPS
ONLINE SYSTEMS: £3-5½K

PROGRAMMERS
(Minimum 1 year ICL)

SENIOR PROGRAMMERS

SYSTEMS ANALYSTS

LECTURERS (SOFTWARE)

TELECOMPUTING
SPECIALISTS IN ONLINE TRANSACTION PROCESSING SYSTEMS

OXFORD LONDON AMSTERDAM

Telecomputing is established as the expert supplier of online systems for ICL computers. TPS is the world's leading tp monitor software on this range.

Our continuing success and outstanding growth means we need more people to work on client projects in London and other U.K. and international locations but particularly at our Oxford offices.

IF YOU HAVE ONLINE SYSTEMS EXPERIENCE OR WISH TO ACQUIRE IT WRITE OR PHONE:

TELECOMPUTING, SEACOURT TOWER, WESTWAY, BOTLEY, OXFORD (0865) 723621

Computer Personnel International

110 St. Martin's Lane, London WC2N 4BH
Telephone: 01-836 6775

MAJOR U.S. BANK—LONDON

Senior Systems Analysts
£6,500-£8,000 + benefits

Analyst/Programmers
£5,500-£7,000 + benefits

Our Client's London computer department has plans which currently include the complete re-write of the branch banking systems and the development of an International Overseas Network. Additional staff are required to undertake this advanced and challenging development work.

The current equipment comprises IBM 370 under OS with IMS and COBOL together with PDP 11 with AIMS and RSX. Experience of either of these systems is required. However, versatility is the keynote to the success of this department and high calibre professionals, who feel this environment is for them, should not hesitate to apply.

The company offers an above-average salary together with an excellent benefits package including subsidised mortgage and bonus scheme.

For full details telephone LINDA BENSTED.

Real Time People — Computing Services Association — Computer Room People

Computer Personnel International

110 St. Martin's Lane, London WC2N 4BH
Telephone: 01-836 6775

MARK IV
USA $25,000

We have an urgent requirement for MARK IV Analyst / Programmers for a contract in New York. Salary package to $25,000, including expenses and round-trip air fare.

We also need people with a variety of skills to join our software house, Computer Systems International, to work both here and in the USA. Of particular interest to us are programmers and analysts with Cobol and/or Assembler experience on minis or mainframes. We offer a wide variety of work and an excellent salary package.

Contact LINDA BENSTED
or JUDY GRAYDON
for further details

ANALYSTS & PROGRAMMERS
NORTH LONDON/ HERTFORDSHIRE

Our Client is seeking additional D.P. staff to join their expanding applications software team, developing systems for their Clients. Plans include upgrading their large IBM mainframe to a 370/158 early next year.

The work covers a wide variety of systems and provides excellent opportunities for experienced analysts and programmers to further develop their skills in a highly professional environment.

The company offers very competitive salaries plus large company benefits and realistic re-location expenses where appropriate.

If you want to contribute to the successful development of a forward-looking company where individual efforts are recognised, then call today for further details.

Contact JUDY GRAYDON

PROGRAMMERS
OPERATORS
SHIFT LEADERS

WHY NOT USE YOUR DATA PROCESSING EXPERIENCE IN THE FIELD OF PERSONNEL CONSULTANCY?

C.P.I. is one of the most professional consultancies you could hope to find, and this professionalism has led to our opening an office in New York. I am going to the States in the New Year to set up the Personnel division and need someone to take over my work in the London office. Essential qualifications are a D.P. background, outgoing personality, self-motivation and the ability to communicate effectively with both applicants and clients.

If you can meet a challenge and feel that you have something to offer us (we can offer you interesting and varied work with a good salary package) contact me immediately.

MARILYN DAVIDSON

Real Time People — Computing Services Association — Computer Room People

Senior Project Engineer

This position is in the Production Department of the Ferranti Digital Systems Division at Waterhead, Oldham.

The department handles a range of products based upon computer systems and associated equipment for supply to Government bodies and Civil Aviation authorities in this country and overseas.

The successful candidate would have overall responsibility to Management for a particular project and would be responsible for co-ordinating the work of all sections of the department concerned with the project so as to ensure that contractual obligations are met most effectively. This section would include Design Drawing Office, Planning and Progress Departments, Inspection and Final Test.

Candidates, male or female, should be of at least HNC standard in Electronic Engineering and/or have sound relevant experience. Preferred age range 35-45.

Application forms may be obtained from T. J. Lunt, Staff Manager, Ferranti Limited, Hollinwood, Lancs. OL9 7JS, quoting reference DSD/RLA/CW.

FERRANTI

Project Leader/Manager

APL — High Salary

Our client is a large and successful multinational computer manufacturer currently beginning a major expansion of its existing UK based software development group.
The company has decided to provide APL capability on its fourth generation computers and requires a first rate person to head up the development.
The successful man or woman will have already played a major role in implementing an APL system and have project management experience or proven potential.

Rewards include a highly competitive starting salary plus excellent fringe benefits, good career prospects and generous assistance if needed with relocation. (Ref: E5686/CW)

REPLIES will be forwarded direct unopened and in confidence to our client unless addressed to our Security Manager listing companies to which they may not be sent. They should include comprehensive career details, not refer to previous correspondence with PA and quote the reference on the envelope.

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PROGRAMMERS
ANALYST/PROGRAMMERS

UP TO £7000

SMALL BUSINESS SYSTEMS IMPLEMENTATIONS

ICL 2903/2904

IBM SYSTEM/3, SYSTEM/32, SYSTEM/34

A major British software house is expanding its business in the area of small business systems implementation and software. This is a rapidly expanding area of business, and the company's continued growth will be constrained only by their ability to undertake and staff projects with high calibre personnel.

As a result, the company now wishes to recruit Analyst/Programmers to work in their Small Business Systems Division. They will support commercial clients who plan to implement small mainframe computers for general business applications, using RPG11 as the main programming language. Analyst/Programmers are responsible for systems design for the client and prepare detailed programming specifications. They are expected to ensure the successful completion of projects to the client's entire satisfaction and according to agreed timescales. They will also supervise Programmers on clients' projects.

The company is one of the leading UK systems houses, established nearly ten years ago. It is backed by a substantial industrial organisation and is therefore well placed to take advantage of an expanding market. Most of its work has been UK based but it is now looking for a growing proportion of its work to come from Western Europe.

ANALYST/PROGRAMMERS who have not worked with RPG11, but who otherwise meet the requirements of the job should not be deterred from applying as RPG11 training can be provided.

This is an excellent environment in which to develop your creative abilities and to make a meaningful contribution to the furtherance of your own career.

Please phone Tony Baker on 01-499 4501 during business hours or 01-445 3512 at other times to discuss without commitment these opportunities.

RW 37/1

hutchinson-scoggins recruitment
10 Dover Street London W1X 3PH Telephone 01-499 4501

Northern Regional Health Authority

Intermediate Systems Designer

Applications are invited for the above post in our Regional Computer Centre.

An I.C.L. 1904S computer is currently used under the George III operating system. Peripherals include EDS and Magnetic Tapes. MOP terminals are used and at present 2 remote terminals are connected.

The successful candidate is likely to have had several years' Cobol programming experience, with the ability to control and direct the work of a small team of programmers.

Salary scale £4528-£5503 (including Stages I and II non-enhanceable supplements).

Application form and job description available from the Regional Personnel Officer, Northern Regional Health Authority, Benfield Road, Walkergate, Newcastle-upon-Tyne NE6 4PY. Closing date 30th September, 1977.

Oxford Medical Computer Centre

PROGRAMMER Scale 1/4

Salary:
Scale 1 £3,003 + 5% — £3,846 + 5%
or
Scale 4 £3,846 + 5% — £4,656 + 5%

A Programmer is required to complement a team producing real-time hospital systems in Oxford. The job will provide an excellent opportunity to gain experience in real-time programming. Knowledge of one or more of the following would be especially useful: CTL Modular One, DEC PDP-11, Real-time Systems, Database Systems, Hospital Computing. The job is on a fixed term contract until March 31, 1979.

For further details and application form please contact (quoting reference V84/77), The Recruitment Officer, Oxford Regional Health Authority, Old Road, Headington, Oxford OX3 7LF. Tel. Oxford (0865) 64861, Ext. 265.

Closing date for applications 27th September, 1977.

Oxford Regional Health Authority

QUEEN MARY COLLEGE
University of London
DEPARTMENT OF COMPUTER SCIENCE AND STATISTICS

RESEARCH ASSISTANT/

required, who will be expected to participate both in research into new computational methods for the Statistical Consultancy and programming projects in the Department's Computer Science curriculum.
Applicants should have a good honours degree in mathematical science and a sound background in both numerical and non-numerical computation. Experience with Algol-68 a definite advantage, as also a working knowledge of statistics. Initial salary in range £2904-£3761 p.a. plus £450 London Allowance.
Please apply by letter, with curriculum vitae and names and addresses of 2 referees, to the Registrar (CW), Queen Mary College, Mile End Road, LONDON E1 4NS.

SUPPORT ENGINEER — COMPUTER PERIPHERALS

Geveke Electronics Limited need a competent support engineer to assist in the additional workload created by the expansion of the U.K. Company.

Geveke is a major supplier of terminals and peripherals in Europe and the chosen candidate will receive training both in Holland and the U.K. Sales of our products are expanding rapidly and we therefore need a well qualified engineer experienced in computer peripherals to assist in this expansion programme.

Direct customer liaison, assistance with demonstrations and matters relating to all areas of support and maintenance will be included in the range of responsibilities. Salary up to £5,000 per annum. 4 weeks annual paid holiday.

Please apply to The General Manager, Geveke Electronics Limited, KHC House, Vale Farm Road, Woking, Surrey or telephone Woking (04862) 71337.

SYSTEMS ANALYSTS

Creaking Old Systems + New Hardware = Your Opportunity?

Our client based in Greater London readily admit that some of their systems are a "bit ragged" around the edges.

They now need to completely redevelop these systems and are looking for a number of analysts at both senior and junior levels who have a professional business approach to the development of computer systems.

Let us make a bold statement — "we believe our client today has more to offer in terms of career development and job interest than most other companies". "They now want to meet some experienced analysts who know how to deal with users and who will be able to bring a substantial background of manufacturing or accounting systems to bear in an environment where the impact of computer systems is very great.

We realise that we have not decribed any specific job — we have suggested a career opportunity! What we are really saying is if you think you are good and you want to join a company which offers something different, then you should contact us. On this occasion, we will put you in touch with the client almost immediately. There will be no preliminary interview with ourselves — either a brief discussion on the telephone, or a short letter from you.

Please give us a call — we will start working for you right away.

Contact John Goldsmith quoting reference no 771.

Computing Services Association

WE ARE ALWAYS INTERESTED IN HELPING *YOU* WITH YOUR CAREER

John Goldsmith (Computer Recruitment) Ltd., 15, Buckingham Palace Road, London, S.W.1.
Tel: 01-828 5356–24 hour answerphone service.

JOHN GOLDSMITH (Computer Recruitment) Ltd.

Computer Professionals. You could be a teacher in a class of your own

(and help develop the forefront of training technology*)

Now you have attained more than a degree of proficiency in your computer field, perhaps you'd like to diversify a little and teach others what you know about programming, operating or maintenance engineering.

If so, read on, because Control Data Institute — the educational service of Control Data Ltd., world leaders in all aspects of computer products, systems and services — are looking for people aged 24+ with at least 2 years' experience in the computer industry, to become Instructors.

You can earn up to £5,000 p.a. initially, with progression to higher scales.

We're specifically looking for the following:

COMPUTER PROGRAMMING INSTRUCTORS

COBOL experience essential, plus IBM Assembler/ICL PLAN or other low level language. RPGII would be advantageous. Vacancies exist in London, Southampton and Manchester and you should be prepared to work away from your home base occasionally.

COMPUTER OPERATING INSTRUCTORS

IBM 360/370 system and/or ICL 1900 GEORGE 2 experience required, with GEORGE 3 experience an added advantage. This position is based in the North West with travel between Birmingham, Leeds and Manchester.

COMPUTER MAINTENANCE ENGINEERING INSTRUCTORS

Sound experience in maintenance of peripheral equipment, ideally that of a major manufacturer. Based in London at Control Data Institute.

If you have the aptitude and motivation to teach others, we can offer you generous ancillary benefits in addition to an attractive salary. PLUS the incentive of a challenging and ever-interesting career.

Phone Susan Robinson on 01-637 2171 for a personal details form, or send your brief C.V. to:

Tony Fairfoot
Control Data Institute
77 Wells Street
London W1P 3RE

CONTROL DATA

*We are just now installing our multi-media individualised training system, and will shortly incorporate Computer Based Education techniques.

MINI SPECIALIST

£4692-£6192 + 5% supplement

The Central Electricity Generating Board invites applications for the above position which is available in the Software Support and Telecommunication Group of the Computer Branch at 'Roseneath,' Bramhall, Cheshire.

This Group looks after manufacturer's software including operating systems, compilers and datadrive telecommunications software and low level language programming.

The successful candidate should have a knowledge of interfacing techniques to analogue and digital processes using mini computers, and should have some programming experience in this field. If necessary, training will be given in the other work of the Group.

The central Regional computer is a 192K ICL 1903T with discs, magnetic tapes, line printers and document readers. Terminals are supported by this configuration at power stations and Regional H.Q. departments. An ICL 7905 is linked to the 1903T and the IBM 370 at Board H.Q. and supports VDU and printing facilities.

Previous applicants need not re-apply

Applications in writing, from either sex, giving details of age, experience, qualifications, etc., to the Personnel Manager, C.E.G.B., Europa House, Bird Hall Lane, Cheadle Heath, Stockport, Cheshire SK3 0XA, to arrive no later than 27 September, 1977. Please quote vacancy number 151/CW.

COMPUTER OPERATOR

(male or female)

required for a sophisticated satellite computer system in pleasant academic surroundings. Previous experience preferred but not essential. Starting salary in range £2142 p.a. rising to £2994 p.a. plus an allowance of approximately £340 for two shift working 4 weeks' holiday, superannuation scheme

Apply in writing with full details to, Computing Manager, King's College, London, Strand WC2R 2LS.

OPERATOR

We are a computer service bureau based within 5 minutes of Oxford Circus, primarily serving the advertising industry, and we need a Junior Operator, ICL 2903 or 1900 experience preferred but not essential. Only 2-shift working, good salary and conditions with opportunity for programming and early promotion possible. Ring or write: David Shine, Adserve Computing Ltd., 31-36 Foley Street, London, W1. 01-637 9031.

Denjon International Ltd are looking for a Data Analyst

to work with one of their major clients, carrying out analyses of a number of multinational market research studies and advising on the interpretation of such analyses. Data retrieval will be carried out by means of Denjon's tabulation package, QUANTUM, on the clients' own IBM 370/158.

The successful applicant will have at least three years' experience either of market research or of data processing, but preferably both; he/she will be looking for a salary in the range of £4,000-£5,000 and be prepared to work in Central London, making occasional trips to Europe.

For more information, please contact
Phyllis Macfarlane or Rick Moore at Denjon 01-240 1666

MAJOR NEW DEVELOPMENT FOR AN INTERNATIONAL ORGANISATION

Centre-file is one of the leading computer bureaux in the U.K. currently providing services to some 2,500 industrial and commercial organisations, many of which are household names.

We have recently acquired a major contract to redesign The Diners Club Credit Card System and as a result require additional programming and systems staff to supplement our existing research and development team. The new system will incorporate new Data Preparation techniques and Software to be operated on our IBM 370/155 equipment.

Our requirements are as follows:

SENIOR SYSTEMS ANALYST

Salary range £5320-£6400

This is a senior appointment, reporting to the Project Supervisor, requiring a highly-motivated 'self-starter'.

Applicants should have a Cobol programming background with at least two years' systems design experience. Responsibilities will include the specification and control of a wide range of hardware together with the overall monitoring of the day to day progress of the development team.

COBOL PROGRAMMERS

Salary range £3100-£5320

Vacancies exist within the Research and Development team for Cobol Programmers. Salary will depend upon experience, however applicants should have a minimum of 18 months applications experience.

An attractive range of fringe benefits are applicable to all positions and applications should be made in writing to John Masterson, Personnel Manager, Centre-file Ltd., Boundary House, 18-22 Furnival Street, London EC4A 1JU.

REPRESENTATIVES FOR COMPUTER SUPPLIES COMPANY

Representatives required for a progressive company expanding [illegible] South/South West England marketing computer supplies.

The vacancies should suit persons of either sex with sales, system design or computer operation experience, a lack of sales experience will be no bar to the right person as product training will be given.

The position offers an attractive basic salary and an excellent [illegible] together with a company car and other fringe benefits.

Please apply in writing to: Peter Fiske, Symbiss Computer [illegible] Holdenhurst Road, Bournemouth, Dorset, or telephone Bournemouth [illegible] 23775.

Salary up to £10,000 p.a. or more!

Systems Programmers

Come and talk informally with IDEC – You could hear something to your advantage

IDEC, the Design and Development Centre of ITT Business Systems and Communications Group is responsible for the major software development activities of the new products marketed by this worldwide group.

We can offer you:

- 'State of the Art' Software developments in:
  - Real Time
  - Software Engineering
  - Microprocessors
  - Distributed Processing
  - Compilers
  - Data Communications
- A relaxed professional work environment on London's Green Belt, (current locations are Cockfosters, Potters Bar and Sidcup).

We are only looking for the *best* software professionals, people dedicated to improving the software development process and expecting to be justly rewarded for it.

We recognise potential at all levels, good programmers with one year's experience, high flyers in their twenties, right up to the seasoned software veteran at the top of the ladder.

It might surprise you to find out just how much we value your software expertise.

We'd like to tell you more about the opportunities currently existing within IDEC. Why not come along and talk to us over a drink!

If you cannot come along on these dates, then telephone us on Potters Bar 44137, or write to:

Mr. J. Healey, Personnel Manager,
IDEC, Canada Life House,
Potters Bar, Herts.

Come along to:
THE MARLOW ROOMS, SIDCUP, KENT
on Tuesday September 20th
between 12 noon and 9.30 pm
– ask for the "Rotary Room."
OR
THE CAFE ROYAL,
68 REGENT STREET, LONDON W1.
on Thursday September 22nd
between 12 noon and 9.30 pm
– ask for the "Josephine Suite."

IDEC

Systems Engineering

logica

The activities of this group continue to grow steadily and to present attractive career prospects. We are engaged on a wide variety of real-time work based on minicomputers and microprocessors. Right now, we are working on an industrial telemetry project, a customised data collection/terminal support system and special developments in security, banking and medicine. Much of our work involves data communications, often abroad. We are building (yes, building !) a powerful medium-scale computer and intelligent terminals.

We presently have vacancies for **Real time Analysts** and **Programmers** with experience in dedicated minicomputer applications in real-time or enquiry-based systems. Three to eight years' experience and a good knowledge of software systems and techniques applied to at least one relevant application area is required. The more senior applicants could also be eligible for work as **Team Leaders, Project Leaders** or **Consultants** within the group's operation.

For these posts a high standard of literacy is required and candidates with degree or equivalent qualifications are preferred, although relevant experience and personal motivation are the key qualities we are looking for.

Benefits include a pension scheme, season ticket loans and a house purchase scheme.

Call Kathleen Scott, the Group Personnel Officer, on 01-637 9111 or send your career summary quoting reference SE/2, and using Freepost to

Logica Limited
Freepost
PO Box 4SE
64 Newman Street
London W1A 4SE

Account Managers Senior Sales Executives Sales Trainees

Do you have a sales career- or is it just a selling job?

Many salesmen within the Computer industry find themselves in a dead-end, trapped between an annual sales quota and 'dead mens shoes'.

From a planning and motivational point of view, someone has yet to come up with a worthwhile alternative to individual sales-targets, but when it comes to personal advancement the salesman's future is a function of his employer's capacity to provide opportunities for job enhancement, which in turn is dependant on a company's size, stability, diversity and awareness of the need for individual growth.

At Control Data Ltd., we have a product range and a management philosophy which can satisfy the aspirations of the most ambitious salesman.

Control Data is the world's largest supplier of computer services.

Data Processing Services offer a wide range of applications products and communications based services for Commercial Users. Present facilities are planned to be substantially increased.

Cyber Services provide a comprehensive portfolio of applications products and services for Scientific and Engineering users, via our European Network of CDC Cyber 170's, 7600's and 6600's. CALL/CDC makes available a comprehensive interactive computing service via an International Network of large scale equipment with a wide range of applications products for Financial Planning and Business Management.

Control Data is the world's largest independent supplier of peripheral equipment.

We supply other Computer Manufacturers, Systems Houses, and End Users with a wide range of computing equipment including Magnetic Tape and Disk Drives, Mass Storage Devices, Printers, Core-Memories, OCR equipment, VDU's and other terminal devices.

Control Data is the world's largest manufacturer of scientific computers.

The Cyber 170 Series is a dominant force within Engineering and Scientific computing, with its range of upward compatible systems from the 'low-entry' Cyber 171 to the large scale Cyber 176.

The continual expansion of Control Data and the related advancement of our personnel has created an immediate and ongoing requirement for top class sales people from the account manager to the trainee level.

Successful applicants will be offered not only attractive rewards and incentives (some of our salesmen earn over £20,000 a year!) but also real scope for personal advancement both up and across the total sales organisation.

The qualifications for joining Control Data are very straight forward. Whatever aspect of our product range appeals to you most, and whether you are currently selling *Computer Services, Business Systems, Software, Peripheral Equipment, Micro, Mini or Mainframe Computers*, all we ask is that you have a proven record of sales success; unless of course your current aspirations are merely to enter the sales profession.

Please write, enclosing comprehensive details of your career to date, to Diana Hale quoting reference SMSC/1.

All our job opportunities are available to either men or women applicants.

CONTROL DATA

22a, St. James Square, LONDON S.W.1.

Australia
Programmers and/or Analysts

(Computer Systems Officer)
SA10863-13541 (Approx £E6860-8550)

Telecom Australia invites men and women to apply for positions involving a variety of programming work covering areas of —

- design, programming and maintenance of commercial and processor controlled systems
- provision of operational and technical support
- software enhancement and development

QUALIFICATIONS: At least three years full-time experience as a programmer and/or analyst will be required. It would be desirable for such experience to be supported by the knowledge and understanding at least equivalent to that gained from successful completion of a tertiary qualification majoring in computing science with sufficient emphasis on one or more of the programming areas described above.

Telecom Australia is the government-owned telecommunications commission providing telephone, telex, and data transmission facilities throughout Australia.

Successful applicants would be offered permanent appointment to work in Melbourne, and would be eligible for economy air travel to Australia for self and spouse and dependent children together with reasonable settling-in expenses. Salary payable within the above-mentioned range would be dependent upon assessment of the appointees' relevant experience and knowledge.

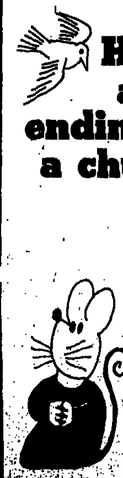
A representative of Telecom Australia will be in London between 19 September and 5 October 1977, to assess applications and conduct interviews.

Meanwhile, prospective applicants are invited to mail details of experience, qualifications, and other personal aspects (including contact point phone number and address) before 19 September, to:

Mr. D. J. Read,
Telecom Australia Representative,
C/o Clients' Mail,
American Express,
International Banking Company,
6 Haymarket,
London.

Telecom Australia

Square Deal for Freelancers



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one
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66 Market Square, Chesham, Buckinghamshire

EUROPE'S LEADING SPECIALIST RECRUITMENT CONSULTANTS

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LONDON

SYSTEMS ANALYST
SYSTEMS PROGRAMMER
SALARIES UP TO £6,600

As a result of expanding IMS based development our client is able to offer an outstanding opportunity to enter the IMS environment. The candidate selected will receive full training and have the opportunity to work with an experienced consultant in providing working support to application development teams. Support to be provided includes transaction design, use of MFS, data base design.

This vacancy will be filled by someone from one of the following backgrounds:—

SYSTEMS ANALYST — Candidates will require a good technical background and continuing technical interest. They will have had a minimum of about 4 years programming experience mainly in an IBM environment and must be able to demonstrate in depth design experience.

SYSTEMS PROGRAMMER — Candidates should have a minimum of about 3 years IBM, OS or VS experience. This position will appeal to those looking for an opportunity to broaden their career prospects.

The successful candidate will be capable of working with limited supervision and must be confident of his ability to communicate satisfactorily with D.P. people.

Our client is a large U.K. Company with offices in many U.K. locations and some travel will be involved. The Company offers high job security and opportunities for longer term career development within several divisional D.P. departments.

PLEASE TELEPHONE WITHOUT DELAY OR SEND A CAREER RESUME TO THE ADDRESS SHOWN.

Ref: CW 912.

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LINSCOTT computer systems

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★ **IBM** SYSTEM 3—RPG	HANTS
★ **IBM** PL/1 — VM CMS — CICS	W. LONDON
★ **IBM** ASSEMBLER — OS	ESSEX
★ **UNIVAC** COBOL — EXEC. 8	LONDON/ESSEX/BIRMINGHAM
★ **ANY** ASSEMBLER — PL/1 — COMMUNICATIONS	ESSEX
★ **H'WELL** COBOL — TDS — GCOS	LONDON/ESSEX — MANCHESTER
★ **ICL** FORTRAN — G.II	LONDON
INTEL — ASSEMBLER / COMMUNICATIONS — SYSTEMS DESIGNERS / SENIOR PROGRAMMER/ANALYSTS	LONDON
★ **IBM** — COBOL — DOS/VS	HERTS.
★ **ICL** SYSTEM 4 — USERCODE — COBOL	S. LONDON

WE ALSO HAVE A NUMBER OF OVERSEAS REQUIREMENTS THAT HAVE ARISEN, CURRENTLY, THESE ARE:

★ **UNIVAC/IBM** — FORTRAN — SENIOR ANALYST/PROGRAMMER WITH AN ENGINEERING BACKGROUND	HOLLAND
★ **PDP 1100** — ASSEMBLER	SWITZERLAND
★ **IBM** RPG — COBOL (FRENCH USEFUL)	BRUSSELS
★ **ANY** COBOL — SENIOR PROGRAMMERS	EIRE

IF YOU ARE a) CONSIDERING CONTRACT WORK, OR b) WORKING IN A CONTRACT ENVIRONMENT ALREADY, **TELEPHONE OUR OFFICE** NOW TO ARRANGE YOUR FUTURE WORKLOAD.

PERMANENT

A LARGE INTERNATIONAL FINANCIAL ORGANISATION IS SEEKING EXPERIENCED ANALYSTS AND PROGRAMMERS WITH RPG II EXPERIENCE. CAREER OPPORTUNITIES ARE EXCELLENT TOGETHER WITH VERY HIGH SALARIES AND LOW INTEREST MORTGAGE RATES. DON'T MISS THE OPPORTUNITY AND TELEPHONE OUR OFFICE NOW.

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EAST MIDLANDS or WEST LONDON UK CUSTOMER ENGINEERING MANAGER

Salary & Bonus £6-8K + Car

Our client is a major International Mini Computer Systems supplier and is a substantial force in the small commercial and industrial systems markets. Its established U.K. engineering group provides cover to U.K. only sites through a 15/20 man team. Candidates for the appointment of Manager of the group should have:

- ★ A sound technical background in small computer systems maintenance, probably with relevant professional qualifications.
- ★ Some man management experience, but with the preparedness to retain a field involvement as required.
- ★ The ability to take profit responsibility and to work to a budgetted plan.
- ★ An awareness of the need to maintain good customer relationships.

Standard company benefits apply, coupled with the opportunity of further promotion into an International environment.
CONTACT: PETER RIGBY, ON 021-236-3781. REF. 77/09/18

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Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD
LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

SCR

WEST OF LONDON

REAL-TIME MINIS

PROJECT LEADER TO £7,000

Our Client is internationally acknowledged as being a world leader in the scientific research and commercial development of a unique product embodying a combination of the most advanced computing and scientific concepts.

Continuous development of this high technology product has created an opening for a project leader.

You will lead a small team of programmers and be responsible for full systems design, hardware specification and outline software specification. Apart from supervising the work of your team, you should be aware of the hardware ramifications of changing systems, of commercial factors such as time and cost and of the current developments in the technology used.

You should have extensive real-time mini computer systems design and programming experience, together with proven leadership qualities and the ability to work to tight deadlines.

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UNIVERSITY OF SOUTHAMPTON

COMPUTING SERVICE

Applications are invited for the posts of

PROGRAMMER

to join a team providing software support on the University's ICL 2970 computer

Applicants should have some experience in programming in high level languages on a large scale system. Knowledge and experience of a multi-purpose operating system such as VME B or GEORGE 3 is also essential. Some experience in use of data bases would be an advantage. Starting salary according to qualifications and experience within the scale £2,904-£4,[illegible] or for an exceptionally experienced person scale £3,333-£5,627 (ref: 77/89/CW)

and for

COMPILER SUPPORT PROGRAMMER

to be responsible for the support and maintenance of a PASCAL compiler for the 2900 series currently being developed on the University's 2970 machine.

Applicants should have some experience of the techniques of high level language compiler design and construction for large operating systems. A knowledge of the PASCAL language or the ICL 2900 series computer would be desirable but not essential.

The post will be tenable initially for a 3-year period. Starting salary according to qualifications and experience within the scale £3,333-£5,627. (ref. 77/90/CW).

Further particulars of the above posts may be obtained from Mr. A. J. [illegible] (Southampton 559122 Ext. 357) to whom applications (6 copies) giving a curriculum vitae and the names and addresses of two referees should be sent at the University of Southampton, Highfield, Southampton SO9 5NH, by [illegible] September, 1977. Please quote appropriate reference number.

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PDP	ANY	C. LONDON	OPERATOR	6 MTHS	£3300
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Opportunities exist throughout the group to work on IBM, Honeywell, ICL and Univac hardware. Applications vary widely but can be expected to include Accountancy Ledger Systems, Production/Stock Control, Sales Order Processing and Accounting and sophisticated new package development. EMS in addition have three installations incorporating both Honeywell and ICL hardware. At present, the group is engaged in a multi-million pound investment plan to ensure continued group growth towards both national and international market seniority. We offer a very wide range of group opportunities with sound career development opportunities and sophisticated new product training during 1978 for future turnkey systems or Data Centre involvement. We envisage all candidates being highly motivated, having a reasonable educational attainment with good communication ability and a flexible approach towards good company relations with a marked eagerness to be able to make a personal contribution towards assisting group growth and enhancing our growing reputation. In return, we offer good salaries with attractive reviews, early promotion opportunities and an employer with a growth record second to none in Europe. Back a winner with your career.
Consultant: Denis Filby, Niall Bradley, John Wood.

TOP PACKAGE DESIGNERS & PROGRAMMERS—BIRMINGHAM

EMS are now developing a wide series of Honeywell Level 6 Packages to support our Turnkey Systems activities throughout the U.K. and Middle East. We currently have a series of Accounting based and Sales Packages being tested both at our advanced new Data Centre and due to be given trial runs with Midlands clients for practical field support experience during the next 1-2 months. All packages will be COBOL orientated with work to continue on both commercial and industrial applications, developing from modular batch mode to real time. As the U.K.'s largest Honeywell Support Consultancy Division also, sound career prospects are offered for experienced package development staff. Over £2,300,000 is being invested during 1978-9 on software development and new machine purchases during 1978 with rapid promotion prospects available for experienced Designers or Programmers with previous package development work, able to assist our new development teams and achieve direct client involvement assisting growing quantities of new users throughout the UK. Attractive salaries will be offered in addition to relocation assistance where needed
Consultant: Denis Filby, John Wood.

30+ COBOL PROGRAMMERS

LIVERPOOL & MERSEYSIDE TO £6,000

EMS urgently require a large, increasing quantity of COBOL Programmers to support existing consulting commitments within this region. Retraining to new hardware will be given where appropriate as will both specialist package and software training. We offer facilities to work in large installations handling such applications as Database Development, Financial and Stock Recording, Distribution Systems, Sales Order Processing, Accounting Ledgers, etc. Equally, excellent prospects exist for later regional travel. Relocation assistance provided where appropriate.
Consultant Denis Filby.

BUREAU SERVICES

SALES CONSULTANTS—SYSTEMS, PROGRAMMING & PACKAGES TO £15,000

EMS are seeking to recruit additional experienced Sales Staff for our own divisional and group activities. We seek top calibre, highly motivated career men, doers not desk men, capable of developing substantial new client accounts whilst assisting with established business contracts. We offer top class field support with numerous leads provided by group back-up activities. Candidates must have experience of working for a major consultancy, Turnkey Systems company or Bureau and be capable of earning at least £8,000 with no top limits for exceptional salesmen. Apply today if you are that well motivated.
Consultant: John Wood.

IBM PROJECT LEADERS & ANALYST PROGRAMMERS—KUWAIT TO £20,000 PACKAGE

Kuwait's leading consultancy regularly require additional support staff to cope with growing client support requirements. Applications include, Data Base Design and Development — IMS, CICS, Accounting Ledgers, Design and Programming, Inventory Controls, Banking Systems, Stock/Production Control, Sales Order Processing, Payroll, etc. IBM experience of at least 3 years's mandatory for any level of position from Programmer upwards. Applicants must not have more than 2 children. Preference will be for candidates qualified to HND or degree level. 35 will be the maximum age of consideration with a preference for 25 to 32 years. Relocation assistance will be provided, as well as 3 weeks' paid holiday each year with annual return air tickets home. All Kuwait salaries are tax free and easily transferable to the U.K. if required
Consultant: John Wood.

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COBOL PROGRAMMERS - MIDLANDS - £L130 £140 p.w.
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Systems Analyst Bristol To £4500

The initial task will be to investigate the requirements of a new pension scheme to be introduced during 1978 to determine whether software house packages can satisfy these requirements, to install the package if suitable or alternatively, design a new system and implement when developed. Subsequent work may include development of a new system, installation of an accounting package or enhancements to existing systems. IBM experience will be mandatory with perhaps some programming experience with applications knowledge of Payroll, Pensions and Accounting.
Consultant: John Wood.

IBM Analysts Essex To £5000

Candidates will have completed at least 1 major system and have worked for a minimum 2 years as an Analyst. The successful applicant will report to a Project Leader in a Project Team environment, participating in all aspects of investigation, design specification and implementation of computer based systems. Current systems in process include subscription, accounting and text processing. Systems in use include on-line order entry, royalty, invoicing, warehousing and management information. Relocation assistance provided.
Consultant: John Wood.

Trainee & Junior Programmers Surrey To £4000

Opportunities exist with a large insurance group for both Trainee and Junior Programmers to work on IBM 370 series hardware, using PL/1. Candidates should be educated to minimum 'A' Level in Maths or similar. Career positions exist in both applications development and technical support. Full DP training will be given where appropriate but some DP acquaintance at least will be expected
Consultant: Ann Lennell.

6 Analysts Programmers Wolverhampton Negotiable

Graduates or equivalent are sought to work on IBM hardware, OS/VS1 using PL/1 or COBOL. Knowledge of CICS would be especially advantageous. A wide and varied range of applications systems include Accounting, Payroll, Production Control, Stock Control and Real Time video development. Equally, the group is developing a distributive processing network via intelligent terminals. Relocation assistance given where appropriate.
Consultant: Don Walklate.

IBM Programming Team Leader Essex To £4500

Applicants will have at least 3 years' experience as a Programmer using DOS with COBOL, PL/1 or ASSEMBLER. Some knowledge of VS, POWER/VS or CICS would be advantageous. Previous supervisory experience is essential. The successful candidate will report to the Systems Development Project Leader in a team environment responsible for co-ordinating the work of other Programmers and to design, write and test efficient programmers in accordance with specification.
Consultant: John Wood.

Data Communications Adviser Hants. To £6500

All candidates must be Graduates with, preferably some knowledge of IBM hardware. Duties will include recommending and implementing data communications plans based on existing hardware in the U.K., Central Europe and U.S.A. Applicants must be suitably experienced in telecommunications equipment and protocols. He will probably be a technical person with previous experience with large networking or timesharing users or peripheral equipment suppliers.
Consultant: Don Walklate.

Analyst/Programmer Cleveland To £5500

Candidates must be educated to minimum 'A' Level standard with ICL COBOL Programming experience and possibly RPG. Equally, we are seeking past involvement in a Financial or Sales Order Processing environment. The projects currently in hand incorporate Financial and Sales Order Processing, and on-line. The successful candidate will report to the Systems Manager. Work loading will be 60% Analysis and 40% Programming. Ability to liaise effectively with the Financial Controller and Sales Manager will be important. Relocation assistance where appropriate.
Consultant: Don Walklate.

Analysts & Programmers Oxford Negotiable

Applicants should have a minimum 3 years' IBM OS experience using PL/1 perhaps also ideally with IMS, JCL and TSO would be specially advantageous. Equally, any knowledge of TCAM 3741 and TP would be of special interest. These positions are with a major, well-known engineering group and offer sound progressive career prospects. Attractive salaries negotiated for suitably experienced staff.
Consultant: Niall Bradley.

3 Analysts Hants. To £5000

Duties will comprise Systems Analysis, design and programming of commercial applications incorporating for example Financial, Marketing and Sales and Production Control for associate group companies using the centralised group computer. Knowledge of IBM, DOS, COBOL, RPGII and TOTAL database system desirably. Minimum educational attainment 'A' Level Maths and English. Relocation assistance given where appropriate.
Consultant: John Wood.

Chief Progs. Snr. Progs. & Prog./Analysts London & Home Counties

Experienced commercial Programmers of all levels are required by a major manufacturer for pre and post sales support in a consulting role. Experience of large IBM machines or NCR is required, using COBOL any operating system. Chief Programmers will be responsible for teams of Programmers varying from 10-15 staff and for the education of trainees. General COBOL Programmers and Analyst/Programmers should have approximately 2½ years' experience working on commercial applications. Attractive salaries are offered with varying ranges of duties.
Consultant: Anne Lennell.

Senior Systems Analyst Edinburgh Up To £5200

Applicants will be Graduates or equivalent with sound Accounting and Costing Systems experience within a manufacturing company. Duties will include responsibility for design, implementation and maintenance of accounting, costing and payroll systems within several companies in an engineering group. You should have experience of controlling projects to tight schedules. Project Leader status will soon be available depending upon experience and ability. Hardware is on Honeywell Level 66 with on-line and teleprocessing access and database packages, although previous experience in a purely batch environment is acceptable. Removal assistance paid where appropriate.
Consultant: Denis Filby.

IBM Analyst Programmer Bristol To £4000

This job will involve responsibility for several systems currently running on the computer It encompasses the following functions:
1. Liaison with user departments throughout the Group, thus providing a support service as and when required.
2. Enhancements to these systems, these may be large or small and may entail systems and/or programming work.
3. Maintenance of line run decks including amendments as necessary for hardware and software changes as these occur. Languages will be ASSEMBLER or COBOL under DOS/VS. Minimum 'A' Level qualification with relocation assistance where appropriate.

Consultant: Selina Mills.

Analysts Surrey To £5250

Two Systems Analysts are required at Junior Systems and Senior Analyst levels to discuss user requirements in the Finance, Sales and Distribution areas of this soft drinks supplier, to prepare systems definitions, program specifications, user and operations manuals, design test data and progress through systems and acceptance testing and user training to a satisfactory working system.
In addition to working on feasibility studies for distributed networks, profitability and costing systems and propose viable business solutions.
Consultants: Niall Bradley or Don Walklate.

COBOL/BAL/RPG Programmers Surrey To £4000

Our clients require two programmers at junior programmer level with sound COBOL aptitude (to be tested) with, preferably BAL or RPG as a second language. Depending upon level, they should have had exposure to JCL and utilities and be able to prepare a good design using modular principles, code it and carry out testing according to an agreed test plan.
Consultant: Selina Mills.

Programmers London City £3000-£5100

Our clients, a major bureau require ASSEMBLER, COBOL or PL/1 Programmers with a minimum 18 months' commercial programming experience to work on on-line systems for stockbroker and Building Society projects, Batch Systems for Payroll Services and new developments for Credit Card Systems. Hardware preference will be for IBM 370 range using OS MVT. Relocation assistance where appropriate.
Consultant: John Wood.

Univac Programmer Bucks. To £3600

We are seeking young Programmers with financial order entry and statistics experience or manufacturing systems experience. Ideally, candidates should have around 18 months' experience in COBOL and ASSEMBLER and also RPGII if possible. The installation runs a Univac with disc drives, tape drives and on-line enquiry system. The successful Programmer will be required to maintain financial systems where necessary and to develop new enhancements when required. Equally, opportunities will be available for manufacturing systems involvement.
Consultant: John Wood.

Team Leader/Systems Analyst Leicester To £5500

Production Control Systems experience will be essential for this position in addition to perhaps IBM knowledge but other hardware ranges would be considered. The successful candidate will probably become Project Team Leader reporting directly to the Group Systems Manager. It is envisaged that he will carry out a feasibility study on at least 1 member company to assess their Production Control likely that he will be responsible for the Data Processing requirements of one of these companies. Candidates should preferably be educated to HNC level and possess an engineering background.
Consultant: John Wood.

Analysts & Programmers Edinburgh/Glasgow To £5500

A large International computer manufacturer needs additional DP staff to assist with pre and post sales/marketing studies. Consideration will be given for all ranges of hardware with preference being for candidates with some knowledge of Production Control and COBOL or ALGOL. Preference again will be for Graduates, or a minimum 2 'A' Levels. We envisage all candidates having a minimum 2 years' programming experience. Analysts also. All applicants, must be mobile with a current driving licence, aptitude for client liaison and a good communicator. Duties will incorporate feasibility studies, writing proposals, post sales consulting on systems and programming and general client/manufacturer liaison.
Consultant: John Wood.

Operations Manager — ICL 2903 Herts. To £5250

Our clients, a manufacturing company based in Herts, require an experienced ICL 2903 Operations candidate educated to minimum 'A' Level with preferably some knowledge of Stock and Production Control in manufacturing organisation. Duties will incorporate supervision of all staff in the computer room and Data Preparation areas, responsibility for job scheduling and establishing schedules with user departments, ordering and maintaining adequate media stocks and maintaining comprehensive operating standards.
Consultant: Don Walklate.

4 Senior Analysts & Programmers Merseyside To £4700

Candidates should have a background in industrial based systems with 3-8 years' experience. Hardware preference will be for IBM OS or ICL 1900/COBOL. Knowledge of CICS or DL/1 would be especially advantageous. Analysts will be involved in individual applications working in Project Groups responsible to the Project Manager. Assist in the preparation of feasibility studies through the systems specifications and implementation. Project Planning/control to agreed budget objectives. Liaison with user management and trade union representatives on site. Travel opportunities both U.K. and abroad. Senior Programmers will handle individual applications working in project groups of programming teams responsible to a programming group leader.
Consultants: Niall Bradley/John Wood.

Operator Essex — To £3500

Applicants should be local, accustomed to operating IBM DOS computers with tape and disc drives. The company has off-line links with various regional U.K. sites. At present, they operate 2 shift systems working alternatively 07.00 to 15.00 and 15.00 to 23.00 Monday to Friday. Some paid overtime will be necessary. Operators normally receive 4 weeks' paid holiday per year after completion of a full year's service. Candidates should have at least 1 year's practical experience.
Consultant: Don Walklate.

Honeywell Team Leaders & Programmers Essex — To £6000

A major manufacturer has a series of additional group vacancies for a wide range of experienced COBOL Programmers and team leaders to join an expanding installation converting to a new large installation. Candidates should have experience of working in a manufacturing environment with sound experience of Stock/Production Control and sales Order Processing. Any Honeywell experience gained to date, especially on Level 66, would be especially advantageous.
Consultant: Denis Filby.

Banking Analysts Middlesex — C£6000+

This represents an outstanding opportunity for soundly experienced banking Analysts to join a major international manufacturer, assisting with development of supporting business systems in a pre- or post-sales situation. We envisage the successful candidate being able to function with the minimum of supervision and maintain a professional, efficient image at all times, especially so when involved in direct client support roles. Futuristic banking systems developments are in hand, offering the successful candidate a unique experience of futuristic banking systems procedures.
Consultant: John Wood.

PL/1 Analysts & Programmers Midlands — To £5500

A number of large IBM users have continuous requirements for staff experienced in industrial, Process Control or Commercial applications. Ideally, Analysts should have at least 3 years' practical applications development experience and have worked on at least 1 major system with some degree of autonomy. A wide range of project work is available with opportunities to switch for manufacturing or processing bias to commercial development, or vice-versa if required. Equally, programmers should have at least 1 year's PL/1 experience and be seeking the opportunity of working in a large installation with multi-application projects to work on. Relocation assistance will be provided where appropriate.
Consultant: Don Walklate.

Operators Hundreds of U.K. vacancies — To £5500

EMS are constantly inundated with companies seeking all levels of Operations Support Staff for leading mainframes. We offer a wide variety of employment opportunities on behalf of every county in the country ranging from Junior Shift Operators to Shift and Operations Managers. Prospective employers include Banks, Bureaux, Computer Manufacturers, Distributors, Engineers, etc. Complete the attached application form and let EMS produce early results for you.
Consultant: Don Walklate/Ann Lennell.

ICL 1900 Programmers Preston — To £5000

We urgently require COBOL Programmers for a bureau to work on a wider range of commercial applications including Accounting, Sales Order Processing, Stock Recording, etc. Candidates with anything from 12 months' experience upwards, will be considered. Contact us urgently for interviews next week at the client site and forward the attached application form today.
Consultant: Selina Mills.

IBM Programmers Derby — To £4500

Our clients require a number of additional Programmers and Programmer/Analysts to work in small project teams split, each team 50% development, 50% maintenance. Projects generally are commercial batch work, Payroll, Accounts, Sales, Stores, etc. Language experience should be ASSEMBLER, COBOL or PL/1. Some on-line development is envisaged within the next 2 years.
Consultant: Selina Mills.

IBM Analysts Herts — To £5000

Minimum 'A' Level qualifications will apply for the numerous positions available with a large engineering group currently involved in expanding the range of systems available to users. Small teams are currently working on such applications devevopment as Production Control, Planning, Accounting, Payroll, Marketing. Assistance will be given with relocation where appropriate.
Consultant: Ann Lennell

IBM Programmers North West London & Home Counties — To £5000

A leading food processing group require additional Programmers to work on continuous development and enhancement projects in the Northern Home Counties. Ideally staff will have at least 2 years' PL/1 experience with some CICS and perhaps Assembler. Excellent career opportunities exist for suitable young applicants seeking to gain top level experience with a large, sophisticated user.
Consultant: Don Walklate.

IBM Assembler or Cobol Programmers Manchester — To £6000

Candidates should have at least 2 years' 360/370 experience in an industrial type environment operating as a Programmer or Systems Programmer. A knowledge of CICS would be greatly advantageous but training will be given to alternatively suitable candidates.
Consultant: Selina Mills.

Hardware Salesmen South Midlands & North — To £15000

A major manufacturer with a sophisticated new product range encompassing every level of the market is planning large scale expansion during the coming months. We seek experienced Salesmen, accustomed to maketing mainframes and Minis and able to handle targets of £400,000 to £2½m. Hard, aggressive negotiators are sought with the ability to join in a large scale market penetration plan for 1978 and able by virtue of individual marketing abilities, to earn the level of salary commensurate with a top salesman of £10,000 upwards. Our clients have the product range, the top international reputation and the money to pay you a very attractive overall package if you produce results on the scale required.
Consultant: John Wood.

ICL 1900 COBOL/PLAN Programmers North London — To £5000

Our clients, a major chemical producer, has urgent vacancies for ICL Programmers able to work on Stock Recording and Sales Order Processing projects. The company operates a U.K. network with thousands of individual accounts throughout the U.K. to be co-ordinated and monitored. Experienced staff of all levels are required. Any PLAN experience would be especially advantageous.
Consultant: Niall Bradley.

ICL Analysts Essex — To £5000

Analysts must possess at least 1 year's ICL 1900 installation experience and have worked in a manufacturing and stock control environment with a medium to large group. The group in turn offer complex production scheduling problems, a wide variety of intricate stock control development roles and large company security. Relocation assistance will be considered.
Consultant: John Wood.

ICL 1900 COBOL Programmers West Country — To £5000

A small Gloucestershire bureau has vacancies for additional Programmers to assist with developing client accounts. Candidates will be given appropriate applications training where necessary. Opportunities exist for both Junior and Senior staff working in a very popular location with good middle term career prospects.
Consultant: John Wood.

IBM Programmers — Assembler Barnsley — To £5500

ASSEMBLER Programmers preferably with some software knowledge as you will be working on software and general commercial applications including Production/Stock Control, on-line order entry and Payroll in a real time environment. Applicants should have a minimum 12 months' ASSEMBLER. The group in turn will teach them CICS. Assistance will be given with relocation where applicable.

Analysts/Programmers Leeds — To £6500

EMS currently have a wide range of clients ranging from bureaux, consultancies, computer manufacturers and textile groups with urgent requirements for wide ranges of staff varying from Junior Programmers to Senior Analysts. All applicants seeking positions at up to £6,600 in the Leeds and general Yorks areas are advised to contact EMS without delay and urgently forward the attached application form, fully completed, then wait for EMS to get top results for you also. There are many choices of vacancies available for each candidate.
Consultants. John Wood/Denis Filby.

COBOL Programmers North West — To £6000

Commercial experience in a distributive or accounting environment is sought with preference for candidates having worked on large machines, either IBM, Honeywell or ICL and accustomed to working with a minimum of direction or supervision. Ability to write programming specs would also be of help to suitable programmers indicating seniority potential and ability to help young programmers in a training situation. We require a minimum 2 years' sound practical programming experience with a middle to large computer user. Any machine or operating systems acceptable as new training will be given.
Consultant: Denis Filby.

ICL New Range Analysts & Programmers UK — To £7000

A growing range of New Range purchasers urgently need experienced New Range staff to help them achieve early results and to assist work associates gain a clear understanding of the new equipment. Equally, a wide range of New Range development opportunities are available for staff interested in working either close to the West Country or in the North Midlands. With New Range experience, don't delay, complete the EMS application form and let us obtain results for you. EMS have the vacancies, you have the experience.
Consultants: Niall Bradley/Don Walklate.

IBM Analysts & Programmers Leicester — To £6000

A major engineering group seek a number of staff, preferably experienced in IBM COBOL to work on a wide range of industrial and commercial applications. Any knowledge of the following would be especially advantageous: CICS, On-line/Real-time, IMS and TSO. Numerous additional staff are required to work in growing applications development teams within a major progressive organisation using the latest DP techniques.
Consultant: Don Walklate.

Systems Programmers Herts — to £4500

We seek an experienced PL/1 Systems Programmer to work on IBM 370 using DOS/VS POWER to maintain current software, write and test software as and when required, to evaluate and recommend software packages, to monitor current industrial facilities of interest to the company and to determine causes of computer software and hardware failures.
Consultant: Don Walklate.

COBOL Programmers London — To £5000

A large transportation and distribution group have urgent vacancies for a large number of young, 1-2 years' experienced programmers with ideally some ICL George 3 knowledge and additionally perhaps some FORTRAN would be advantageous. Candidates will be selected on ability to fit into existing development teams and willingness to work on occasions beyond normal hours depending upon work loading priorities. Relocation assistance where appropriate
Consultant. Selina Mills.

Coral/Algol Programmers Leeds — To £4200

A commercial client have early requirements for Programmers with at least 18 months' experience preferably with good working knowledge of high level languages and sufficient business experience to function effectively in a commercial/semi-industrial environment. Assistance will be given with relocation where appropriate.
Consultant: Don Walklate.

PDP Analysts & Programmers Bristol — To £5500

A software house/turnkey systems company have regular requirements for experienced Mini Programmers with ASSEMBLER or BASIC language experience. Any sales or sales support experience in addition would be especially welcomed. Duties will include assisting marketing teams in feasibility studies, developing client applications systems and programs and post-sales support/client applications support negotiation. A current driving licence will be preferable, as would some knowledge of PDP
Consultant: Selina Mills.

FORTRAN/ALGOL Programmer Numerous U.K. — To £5500

We currently have a wide variety of positions throughout the entire U.K. for experienced FORTRAN and ALGOL Programmers. Examples of vacancies include Operating Systems and Software Development on behalf of leading computer manufacturers, Process Control Equipment suppliers and Defence Equipment Manufacturers. Experience of simulation systems would be especially advantageous. We have interesting vacancies spread extensively throughout the U.K. including many leading companies in the Southern Home Counties
Consultant: Niall Bradley

2 ICL 1900 Junior Programmers Birmingham — £3650

Preference will be for ICL 1900 COBOL GEORGE 2 experience in a production environment, possibly having worked on Financial/Management Accounts. Programmers will write COBOL programs from formal specifications supplied by an Analyst, test and assist in systems user testing. They will work in a team environment developing financial systems incorporating Standard Costing, Sales Analysis.
Consultant: John Wood.

Graduate Programmers Glasgow — To £3800

Young candidates are sought with a minimum 2 years' programming experience in either ASSEMBLER, FORTRAN, ALGOL or PL/1. Programmers will work in a group bureau type environment as a centralised bureau service. Applications vary from commercial to Process Control. Sound medium term career opportunities.
Consultant: Selina Mills.

EMS Consultants Ltd
EMS Consultants Ltd
61-63 Lower Street
Newcastle-under-Lyme
Staffs ST5 2RS
Telephone 0782 623665
(10 lines)
Register NOW!

EMS CONSULTANTS LTD.
61 LOWER STREET
NEWCASTLE UNDER LYME
STAFFORDSHIRE, ST5 2RS
Telex: 36636

Management Services & Computing Division
Telephone: 0782 623665/6/7/8
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SURNAME
Other Names
Address — Telephone: Home / Bus. / Ext.
Post Code

Age	Date of Birth	Place of Birth	Nationality	Height	Weight

Married	Children	Car Owner	Driver	Nature of any Serious Illness

Position Required — Required Salary Range
Present Position — Salary

WHERE DO YOU WISH TO WORK

Within U.K.	Yes/No	Acceptable Areas	Abroad	Yes/No
Will you move	Yes/No		Europe	Yes/No
			Middle East	Yes/No

NUMBER OF YEARS EXPERIENCE

Operating	Programming	Systems Design	Systems Analysis	Management	Total

Available for Interviews
Available for Employment

DETAILS OF SECONDARY AND FURTHER EDUCATION

Schools	Date	Examinations Passed

College/University	Date	Examinations Passed

Business Courses with Dates

1. Present Employer — Town
Position — Date Joined

TYPE OF INSTALLATION
Commercial / Manufacturing / Bureau / Banking / Insurance / Education / Scientific / Engineering

HARDWARE	OPERATING SYSTEM	LANGUAGES

Software or Packages
On-Line / R.J.E. / Real Time / Tele Processing / Time Sharing / Data Base

APPLICATION AREAS YOU HAVE BEEN INVOLVED IN (Please Tick)

Cost Accounting	General Ledger	Manpower Planning	Personnel
Budgeting	Credit Control	Stock Control	Payroll
Forecasting	Order Processing	Production Control	O.R.
Corporate Planning	Marketing	Petrochemicals	Radar
Sales Ledger	Distribution	Linear Programming	Statistics
Purchase Ledger	Traffic Analysis	Simulation	

Projects Completed — Responsibilities

2. Previous Employer — Town
Position — Date Joined

TYPE OF INSTALLATION
Commercial / Manufacturing / Bureau / Banking / Insurance / Education / Scientific / Engineering

HARDWARE	OPERATING SYSTEM	LANGUAGES

Software or Packages
On-Line / R.J.E. / Real Time / Tele Processing / Time Sharing / Data Base

APPLICATION AREAS YOU HAVE BEEN INVOLVED IN

Cost Accounting	General Ledger	Manpower Planning	Personnel
Budgeting	Credit Control	Stock Control	Payroll
Forecasting	Order Processing	Production Control	O.R.
Corporate Planning	Marketing	Petrochemicals	Radar
Sales Ledger	Distribution	Linear Programming	Statistics
Purchase Ledger	Traffic Analysis	Simulation	

Projects Completed — Responsibilities

Reason for Seeking Change

Details of type of position wanted

Additional Information —
Please explain below, in an 8-10 line precis, your current duties and applications experience

FOREIGN LANGUAGES

Spoken	Written	Read

Please show the number of years experience of the following. Where your experience is not specified please use the blank spaces.

HARDWARE	OPERATING SYSTEM	LANGUAGES	PACKAGES/SOFTWARE
IBM 360/370	DOS	COBOL	FILETAB
ICL 1900	OS	FORTRAN	DRIVER
ICL 2960/2970	MVT/MFT	ASSEMBLER	CICS
ICL 2903	GEORGE 1	PLAN	IMS
UNIVAC 1100	GEORGE 2	PL1	BOMP
UNIVAC other	GEORGE 3	RPG 2	D BOMP
BURROUGH 700/800	MCP	USERCODE	PERT
BURROUGHS other	Exec 8	AUTOCODE	V SAM
HONEYWELL 66	GCOS	EASYCODER	IDS/TDS
HONEYWELL 6000	OS 2000/200	ALGOL	MICROFILMING
HONEYWELL other	VMEB/VMEK	NEAT	TELEPROCESSING
NCR	J Level	CORAL	DMS
ICL System 4		DL1	
PDP			

3. Past Employer — Town
Position — Date Joined

TYPE OF INSTALLATION
Commercial / Manufacturing / Bureau / Banking / Insurance / Education / Scientific / Engineering

HARDWARE	OPERATING SYSTEM	LANGUAGES

Software or Packages
On-Line / R.J.E. / Real Time / Tele Processing / Time Sharing / Data Base

APPLICATION AREAS YOU HAVE BEEN INVOLVED IN

Cost Accounting	General Ledger	Manpower Planning	Personnel
Budgeting	Credit Control	Stock Control	Payroll
Forecasting	Order Processing	Production Control	O.R.
Corporate Planning	Marketing	Petrochemicals	Radar
Sales Ledger	Distribution	Linear Programming	Statistics
Purchase Ledger	Traffic Analysis	Simulation	

Projects Completed — Responsibilities

PLEASE CHECK THAT EACH SECTION HAS BEEN TICKED APPROPRIATELY

ADDITIONAL INFORMATION
General
Data Processing
Terminals
Software/Packages
Application Areas
Projects and Responsibilities

SYSTEMS MANAGER

with progression to full Data Processing Management

Brentford, Middlesex

Do you have the drive, communications ability, technical experience and business understanding that are necessary to fill a key management position with an international organisation?

If so, you will be interested to learn more about the Systems Management position that has arisen with Pfizer Consumer Products Division, which comprises the sister companies, COTY & UNICLIFFE.

Their Data Processing Department has now reached an interesting and extremely vital stage of development. A VDU network is soon to be introduced for on-line communication to the group's IBM 370 in Kent.

Salary £6,000-£7,000 p.a.
Plus Company car

We would be interested in talking to men and women who have, in addition to the above requirements, an in-depth knowledge of manufacturing/commercial systems ideally in consumer products.

If you are at present a No. 2 with previous total project responsibility, and now feel that you are ready to lead a small enthusiastic team, then this could be the opportunity you seek.

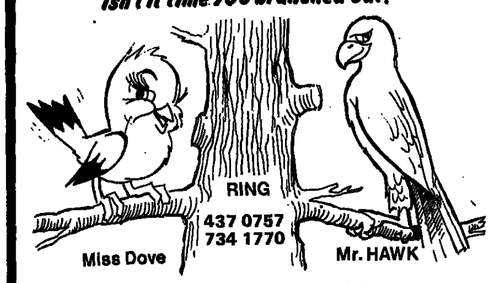
In addition to the salary and 4 weeks' holiday, you will receive an annual bonus and a company car.

Please contact Marilyn Black, quoting reference No. SW748.

Computing Services Association

WE ARE ALWAYS INTERESTED IN HELPING *YOU* WITH YOUR CAREER
John Goldsmith (Computer Recruitment) Ltd., 15, Buckingham Palace Road, London, S.W.1.
Tel: 01-828 5356–24 hour answerphone service.

JOHN GOLDSMITH (Computer Recruitment) Ltd.



Fly to L.A. for some of the best jobs around!

ANALYST/PROGRAMMER c£5,000-£6,000

If you have two years' programming experience and one year in analysis, with a major system to your credit, then this is a great opportunity to learn new techniques and implement fresh ideas with our CITY client.
Phone Mr. Hawk.

RPG II c£4,500-£5,000

We have a number of vacancies, around the LONDON AREA, for people with a good working knowledge of RPG II. If you want to spread your wings, ring Miss Dove.

COMPUTER OPERATORS £2,880-£4,000+

We are constantly seeking experienced operators for a variety of installations in LONDON, the SOUTH and the MIDLANDS, so if you have a minimum of 12 months' experience on IBM, ICL, Honeywell, Burroughs or PDP, Miss Dove would love to hear from you.

PROGRAMMERS c£5,000-£6,500

Our NORTH and WEST LONDON clients are looking for a number of people, so if you have at least 18 months' experience of COBOL, ASSEMBLER or PL/1 on IBM or Honeywell machines, phone Mr. Hawk.

LONDON APPOINTMENTS
(COMPUTING)
5 Naval Street London W1V 3RB

You've seen the advertising for our clients, now come and help us monitor the response

If you have an outgoing personality, with a background in recruitment or the computer industry, aged 25 to 35 years old, and wish to develop in a sales environment then consider this role of a Consultant with D.P. Recruitment. We have a successful team of consultants working in a stimulating and rewarding environment and we wish to add to them in the following areas:

PERSONNEL CONSULTANT (Systems & Programming)

You will be given responsibility for a territory which will include established clients the likes of CBS RECORDS, THE RANK ORGANISATION, SPILLERS, etc. Your role will be fulfilling, because you will work closely with a client on an assignment from start to finish, identifying needs, perhaps suggesting salary scales, liaising with the advertising director on proposed adverts, monitoring response, conducting initial interviews, producing a short list of applicants to the client and maybe advising on final selection.

You will also be given every encouragement to create new business.

OPERATIONS CONSULTANT

We are looking for somebody with either a strong recruitment or operations background to join our present operations consultant in handling the operations recruitment side of our business. This vacancy occurs, because in recent months, we have had an unprecedented demand for client assignments for all ranges of operations staff from Trainee operators through to Operations Managers.

D.P. Recruitment is part of the D.P. Support Services group, which has been established for over four years and has an enviable record of success in the recruitment field. For instance, in the last 12 months over 100 companies throughout the UK have recruited staff through us. With the aid of both internal and external training (where required) we would anticipate your first earnings will certainly not be less than £7,000.

CONTACT IN STRICTEST CONFIDENCE
CHRISTINA J. CARR

D.P. RECRUITMENT LIMITED
Kent House, 87 Regent Street, London W1R 7HF
Tel: 01-437 2062/3/4 (24-HOUR ANSAPHONE)
Computing Services Association

MEMOREX

To sustain the growth of Memorex into the leading position in the computer peripheral market; we now require the following personnel:

CUSTOMER ENGINEERS

FUNCTION:
To assume full account responsibility for existing and future accounts, including a new range of products.

EXPERIENCED REQUIRED —
Preferably 3 or 4 years' experience with a mainframe computer company (preferably IBM) with a good working knowledge of Disc Drive Equipment, Memory and Teleprocessing.

To be based in the London Areas.

We offer excellent salaries, company cars and our normal company benefits.

Please write giving brief resume or telephone Jackie Bell for an application form.

Memorex U.K. Limited, Hoechst House, 50 Salisbury Road, Hounslow, Middlesex. Tel. 01-570 7716. Ext. 153.

Systems Consultants *up to £8,000*

URWICK DYNAMICS have been computer consultants since 1958 and continue as leaders in the field.
We are rapidly expanding our work overseas particularly in Europe and in Central and South America.
To assist in this expansion we are seeking Systems Consultants to join us on either a long or short term basis.
Applicants, in the age range 25-29, should be graduates or have an accountancy qualification. They must have had at least three years experience of Systems Analysis and preferably have some knowledge of one or more of the following:

- Operational Research
- Minicomputers
- Database design
- Distributed processing
- Telecommunications

Successful candidates will be required to travel extensively abroad and ability to work in a major European language would be an advantage.
Salary and other benefits will depend on the choice of engagement which could be either a fixed long or short term contract. This is an exciting opportunity to gain experience of advanced systems design on terms to suit an individual's career development aspirations.

For an application form, men and women are invited to write or telephone in confidence to Geoffrey Leycock at the address below (telephone 01-229 6742) quoting reference no. 578/CW

Urwick Dynamics Limited 9 Monmouth Road London W2 4UT

ZURICH INSURANCE COMPANY
require a

SHIFT LEADER

to assist an established Computer Operations Team based at its Head Office in Portsmouth. The successful applicant will join an enthusiastic young team working with an IBM 360/40 operating under DOS. A challenging long-term development programme includes conversion to an IBM 370/148 using DOS/VS and POWER.

Applicants, who may be male or female, should be at least 25 years of age with a minimum of two years Data Processing experience in a multi-programming environment and be prepared to work a three shift system.

A market rate salary will be paid together with a generous shift allowance allied to a non-contributory pension scheme and assisted mortgage scheme.

Removal expenses will be borne by the Company, if the successful applicant needs to move from another location.

Please write, giving a full career history to:—K. Maw ACII, Staff Manager, Zurich Insurance Company Limited, Zurich House, Stanhope Road, Portsmouth. PO1 1DU.

ZURICH INSURANCE

IRAN OPERATIONS MANAGER

Total Remuneration

£15,000

We need someone experienced in the UNIVAC 1100 series — preferably with UTS 700 terminals — and ideally with an Operations Management background.

There will be the responsibility for recruiting and training new staff plus the ability to control a team of operators and data preparation staff, in a rapidly expanding environment.

A minimum of one year's contract, and we would prefer someone single.

Please telephone or write to Becky Crosby-Jones at

CRL abacus
48 Queens Road, Coventry CV1 3EH. Tel: 0203 21113

COMPUTER OPERATOR

Newcastle-upon-Tyne
Up to £3303

British Gas at the Engineering Research Station Killingworth require someone to provide a computer operating service for a sophisticated data analysis application. Initially the service will be based around a PDP 11/45 computer but equipment needs are currently under review. Duties include interpretation of computer graphics displays and administration of tape and disc libraries.

You should have Maths and English 'O' levels, some computer operating experience and be willing to work outside normal working hours for extended periods.

The salary will be within the range £2361-£2991, plus £312 Flat Rate Supplement.

Please write for an application form, quoting reference OL1/814001/002 to D. Goodhall, British Gas, Engineering Research Station, PO Box 1LH, Killingworth, Newcastle-upon-Tyne NE99 1LH. Closing date for applications 29 September, 1977.

BRITISH GAS

ICL 2900 System Specialists

Nottingham

- Are you capable of becoming a technical specialist in one of the following areas?
  VME/B
  IDMS
  Performance Measurement
  Transaction Processing
  2900 COBOL
  Communications
- Do you want to work with one of ICL's most advanced customers developing sophisticated commercial systems using IDMS and COBOL?
- Are you interested in designing and implementing a real time reservation system using VME/B and the 2900 Transaction Processing Option?

If the answer to these questions is yes then we are interested in talking to you.

We are looking for men or women to fill the following vacancies on one of our large 2900 projects.

- Technical Project Manager (£6500–£8000)
- Performance Specialists (£6500–£8000)
- Operating System Specialists (£5000–£6750)
- Transaction Processing Specialists (£5000–£6750)
- IDMS/COBOL specialists (£5000–£6750)

We also have a small number of similar vacancies in London and Leeds. Assistance with relocation expenses will be given where appropriate.

For more information and an application form, contact Bob Fletcher ext. 426 or Bob Shelley ext. 600 on 01-367 7030 or if you prefer write to Bob Fletcher, ICL Computer House, 322 Euston Road, London NW1 3BL. Please quote reference CW1502.

* If you would like to work on one of ICL's large projects but feel you don't yet have the experience necessary for the above vacancies then still get in touch. We are always interested in meeting people who have the ability to eventually become outstanding technical specialists.

International Computers
think computers think ICL

UNIVERSITY, COLLEGE, CARDIFF

POST DOCTORAL RESEARCH ASSOCIATE

Applications are invited for the post of Postdoctoral Research Associate (Scale 1A) in the Departments of Computing Mathematics and Sociology to work on the S.S.R.C. funded project investigating the use of a relational data base management system in Social Science applications. Salary within range £3,333-£3,781. Duties to commence 1st January, 1978.

Applications (two copies), together with the names and addresses of two referees should be forwarded to the **Vice Principal (Administration) and Registrar, University College, P.O. Box 78, Cardiff CF1 1XL**, from whom further particulars may be obtained.

Closing date 15th October, 1977. Please quote reference 1329.

UNIVERSITY OF LIVERPOOL
Department of Physics

The Department operates an IBM 360/65 computer and makes use of the Rutherford Laboratory 360/195 for the compilation and analysis of High Energy Physics data. An opportunity exists for a

Young Physicist

to assist in this work. A degree in Physics and a knowledge of Fortran are essential. The appointment will be made, according to age, qualifications and experience, on the scale for Experimental Officers (up to £4,911 p.a.) or Senior Experimental Officers (up to £6,627 p.a.).

Application forms may be obtained from the Registrar, The University, P.O. Box 147, Liverpool L69 3BX. Quote Ref. RV/838/CW.

Worcestershire to 6K

Due to expansion and promotion a number of leading companies located in Worcestershire and the attractive surrounding counties require programmers and analysts at varying levels of seniority. The positions are challenging and provide experience in the use of modern Computer Technology.

Salaries are very competitive and relocation expenses will be paid in most cases.

If you regard career progression as a high priority, and either live in this area or would like to, then contact Pauline Walker on 0272 46085.

cb executive (Bristol)

TEMPO TIME-SHARING LTD

is holding a

COCKTAIL PARTY

to celebrate its move to new premises in beautiful Georgian Fitzroy Square. If you are a computer professional — sales or technical — in the timesharing or minicomputer market come and meet us. You may find we have some very interesting job offers in a unique style company. For an invitation, or to find out why we are unique, ring **John Samber** or **Dudley Evans** on 01-388 1827/1828.

BRIGHTON — MINI COMPUTER

PROGRAMMER

to be responsible for operation of Hewlett Packard 9K 9830A with disk.

Applicants should have at least 1 year's knowledge of basic, although graduates will be considered. Previous holder obtained a senior EDP post after 18 months.

Salary £3100-£4000.

Applications giving details of age, qualifications and experience should be sent by 23rd September, 1977, to District Finance Officer, Brighton Health District, 177 Preston Road, Brighton, Sussex.

GLOUCESTERSHIRE COUNTY COUNCIL
County Surveyor's Department

Senior Programmer Analyst

£4759-£5512
inclusive of supplements

Required to join a small team responsible for implementing, maintaining and supporting software used by Department. Areas covered include Highway and Structural design, Traffic measurement, Transportation modelling and management information.

Access to County Council's ICL 19045 (196K, running under George 3) via a video terminal.

Applicants should preferably be graduates with experience in computing and have a background in engineering and/or mathematics.

Assistance with removal expenses up to maximum of £600.

Application form from County Surveyor, Shire Hall, Bearland, Gloucester GL1 2TH. Closing date 30th September, 1977.

Gloucestershire County Council

You want more scope.

We've got more scope. Variety. Ditto.

We're the country's eighth largest specialist engineering group; manufacturing everything from construction and refrigeration equipment to crawler tractors.

A challenge for Professionals and up-and-coming Professionals

The fact that we've nearly doubled in size over the past three years and are continuing to expand – presents our computer people with a unique working challenge ... as systems have to be flexible and programs must adapt to changing market situations. Sounds daunting?

A new IBM 148

Not when you're a member of an expert team – working on a wide variety of projects – in a highly creative environment; using some of the most sophisticated hardware around ... a new IBM 148 arrives in November.

And not, when you're on an established training programme which is aimed both at keeping you up to date with developments in the computer industry and to help you make the most of career prospects – in the Group and Leyland as a whole.

A better standard of living

It's worth considering for the prospects. Not to mention salary and benefit package. As well as the opportunity to join us at Grantham ... complete with attractive countryside, first-class facilities and low-cost housing.

— If you agree – come and join us. We're looking for men and women like you ... educated to 'A' Level, preferably with previous experience in an engineering environment and who've worked with PLI and/or COBOL using IBM equipment. We'd particularly like to hear from:

Programming Supervisor – to organise and motivate a team of programmers and to provide technical guidance to Systems Operations/Project Leaders. Formal training in advanced programming techniques, project control and systems documentation is essential plus a minimum of five years' relevant experience.

Senior Programmers – responsible for designing programs and implementing computer systems modules; must be fully trained with at least three years' programming experience.

Programmers – with two years' experience in a commercial environment.

Please contact:
Peter Smith, Leyland Special Products Group Staff,
Sysonby Lodge, Nottingham Road,
Melton Mowbray, Leicester LE13 0PA
Tel: Melton Mowbray (0644) 4166

Leyland Special Products

Duncan Bransom Recruitment

Senior Programmer £6.500

A major development programme at HERTZ, the world leaders in the car rental business, means that they need the services of an additional senior programmer at their European headquarters at Isleworth, Middlesex.

The systems will be developed to operate on I.B.M. mainframe computers with non-I.B.M. minis front-ending to them.

Applicants should have at least five years' Cobol programming experience preferably using O.S., and should already be working as senior programmers or chief programmers.

Please write or telephone for an application form to:
Roger Griffiths, Duncan Bransom Ltd., 37 Hillcrest Road, LOUGHTON, Essex.
Telephone 01-508 5121

Duncan Bransom Limited

WESSEX REGIONAL HEALTH AUTHORITY

SYSTEMS DESIGN – WINCHESTER

The computing services for the entire Wessex Region are directly managed by the Authority, and centralised at the computing headquarters in Winchester. They provide a computer service for all four Area Health Authorities in the region, covering Hampshire, Dorset, Wiltshire and the Isle of Wight

The work is carried out by 5 teams – Medical, Financial and Administrative, Manpower, Pathology, Hospital and other distributed systems.

The main computer is a 1903T running under George 3. There are District-based CTL Modular 1 and ICL 2903 computers. Other equipment includes Data General Novas.

Senior Systems Analyst/Programmer (Scale 9) £4520.40 to £5503 inclusive of supplements

To be responsible to the Senior Systems Designer for detailed system design, especially for the more complex parts of a particular application area; for planning, writing and testing programmes within a system; and for controlling the implementation of some projects.

You should have at least 4 years' experience including involvement in the design and production of at least one system which has gone into production.

Systems Designer/Programmers (Scale 4) £4022.70 to £4873.20 inclusive of supplements

To be responsible to the Senior Systems Designer for the detailed design of part or whole of a computer based system, and for some aspects of the programming. There are ample opportunities to extend work experience through both internal and external training courses.

You must have several years' experience in systems analysis and design and programming, including the successful implementation of at least one system.

Further details and application forms from the Personnel Department, Highcroft, Romsey Road, Winchester. Telephone: (0962) 63511 Ext. 350. Closing date — 28th September, 1977.

SENIOR PROGRAMMER

Salary Range — £5,010-£5,460 p.a.

London Transport is one of the largest urban transport authorities in the world. In addition to the obvious function of running an extensive bus and train service its activities cover a wide range of support functions including real estate, advertising, catering and most fields of engineering.

It is not surprising therefore that London Transport has a large and expanding data processing department involved in a fascinating variety of work.

Currently there is a vacancy for an experienced IBM programmer to join the Technical Support Group, where he/she will be involved in the support of CICS/VS and DL1.

If you have:

—extensive experience of using IBM 370 series computers, programming in Assembler and/or COBOL.
—good experience of using/supporting either CICS/VS and/or DL1.

then contact our Chief Programmer now, on 01-637 9144. Otherwise write to Staff Appointments and Development Officer, 55 Broadway SW1H 0BD, quoting ref. 273/CW, and giving details of age, qualifications and experience.

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Personnel

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LONDON/SURREY **TO £5,500 P.A.**

Amongst the world's leading manufacturers, our clients have experienced enormous success in the New Business Section of their UK division.
We are retained, in preparation for their continued drive in this market area, to recruit:

1 Senior and 2 Junior Analyst/Programmers

Essentially with COBOL or RPG II (preferably including 1900 experience) with a broad commercial systems background.
At the more senior level your challenge will be in:
- ★ pre- and post-sales project control.
- ★ co-ordinating resources in implementing systems.

More junior candidates will:
- ★ provide more technical support at Customer Centres.
- ★ gain an early opportunity of on site user liaison.

Candidates will possess qualities of enthusiasm, self-motivation, and effective communication.
Demands and rewards are high in this dynamic and varied technical environment; rapid career progression leading at an early stage towards Live-, Large project-, or Support-Centre Management.
CONTACT LONDON OFFICE, 01-935-0671. Ref. NO. 77/09/16.

A SECOND CITY OPPORTUNITY TO DEVELOP YOUR PROGRAMMING SKILLS

Salaries c. £4,200 p.a.

We are retained to recruit Programmers for our Clients, the Headquarters of a major manufacturing and distribution organisation, for their Management Services function.
Substantial systems development plans based on IBM and mini computers instigate the need for experienced Programmers to work utilising COBOL, CICS and Database software.
If you are an experienced COBOL/PL1 or Assembler Programmer, and wish to develop your skills by learning another language, this is your opportunity.

Candidates should possess:
- ★ A minimum of twelve months' programming experience.
- ★ Enthusiasm, self-motivation and the desire to progress in a professional and well-managed installation.

The Company offers attractive salaries, relocation assistance, and benefits including discount on Company products.
CONTACT: CATHY TRACEY, 021-236 3781 REF. 77/09/17

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SPECIALIST COMPUTER RECRUITMENT LTD.
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Computing Services Association

Develop with us.

Programmers up to £5,000
Senior Programmers up to £6,000

The European Development Group of DATA 100 is continuing its expansion plans to take on a significant portion of software development for the world wide market.

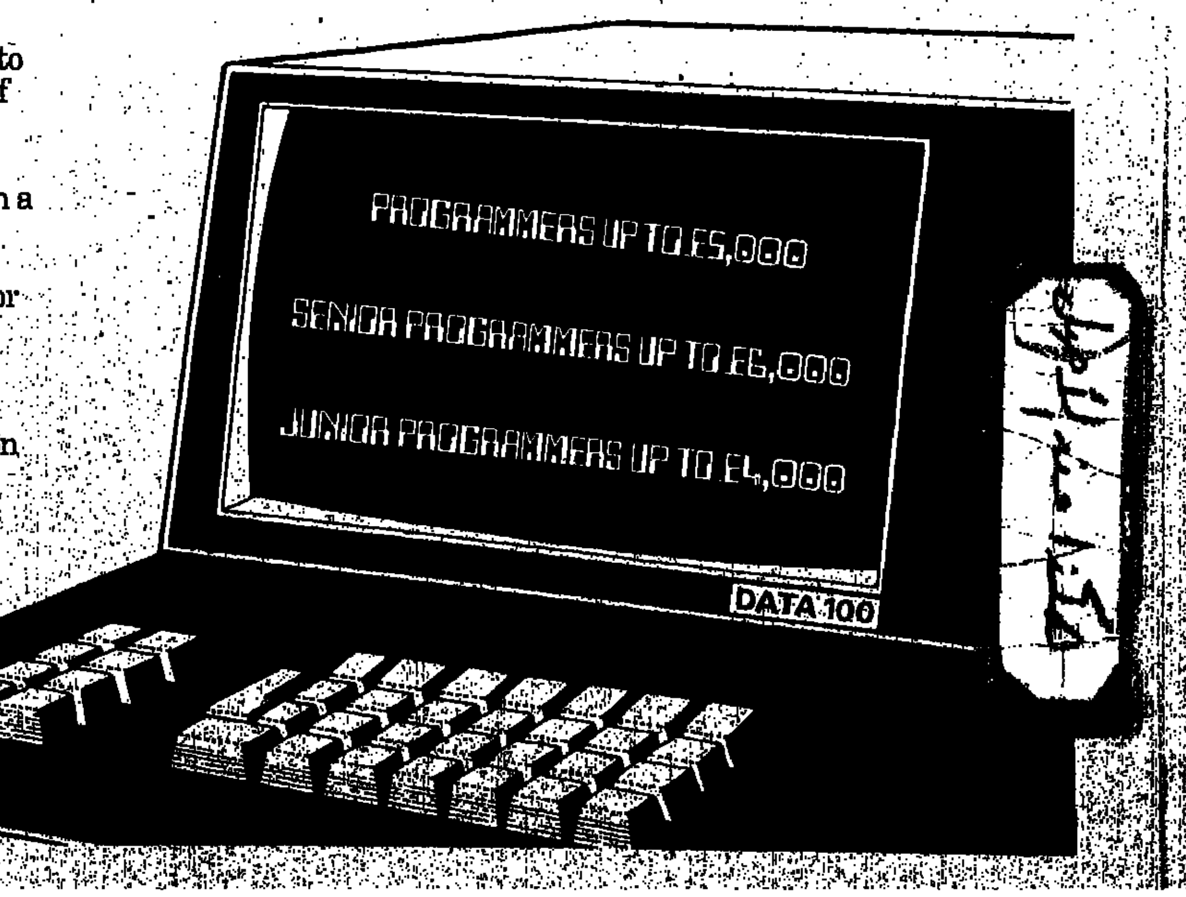
We are currently seeking PROGRAMMERS and SENIOR PROGRAMMERS to work in the development and product testing of system software for a variety of applications including On-Line File Management, Data Entry Systems, Stand Alone Processing and Remote Job Entry.

Candidates should preferably have experience at assembly language level with a mini, micro or VRC manufacturer and be keen to work in a demanding environment. Generous salaries will be paid to suitably qualified candidates, together with relocation benefits where appropriate. There are opportunities for travel to the U.S. and Europe.

We also have vacancies for JUNIOR PROGRAMMERS up to £4,000.

If you feel that you have the ability to make a significant contribution to the future development of this company, please telephone or write for an application form (quoting ref. EC9) to:

The Personnel Manager,
DATA 100 Ltd., Maxted Close,
Hemel Hempstead, Herts HP2 7LD.
Telephone Hemel Hempstead 61281.



DATA 100

H. PROGRAMMING & SYSTEMS LTD.

We are the permanent recruitment division of an established Computer Services Consultancy. We have **MANY** vacancies on our register which may be **JUST RIGHT** for **YOU.** Some of our latest requirements are set out below. Why not telephone our Joan Lovejoy at Amersham (02403) 22201 or 01-437 3063

WANTED in **SOUTH LONDON — SYSTEMS DPM** age group 25-35. A degree in one of the sciences an advantage. Strong technical IBM background 360/370 range. In-depth knowledge of TP, DOS and DOS/VS. Experience should include BAL and commercial applications. Salary £7k+ and company car.

PROGRAMMERS and SENIOR PROGRAMMERS

£3.7k-£6.7k

LONDON	IBM 370/115 PL/1 Ass. (E.C.3) Mini DG Real Time Ass. (E.C.1) IBM 360/30 RPG 2 Mini Systems Cobol, Fortran Ass. (W.C.2) Honeywell 6060 Cobol (N.1) (we have many more vacancies in the London area, please ring for details)
AVON	IBM 370/125 Ass or Cobol
BEDS.	IBM 370/138 PL/1 or Cobol
BUCKS.	IBM PL/1 or Ass (CICS ess.) IBM 370/138 Cobol IBM Sys. 3 RPG II ICL 1902A Cobol or Plan
ESSEX	IBM 370 Cobol or Ass or PL/1
GLOS.	ICL 1900 Cobol or Plan
HERTS.	ICL 1900 Cobol IBM 370 Cobol
KENT	ICL 1900 Cobol
LANCS.	IBM 370 Cobol ICL 1901A Cobol PDP 11/34 Ass pre. Macro.
MIDDX.	Honeywell 3200 Cobol IBM 370 Cobol or PL/1 IBM Sys 3 Cobol
SOMERSET	ICL 1900 Cobol
STAFFS.	IBM 370 PL/1
SURREY	Honeywell H.316 Cobol IBM 370 Ass or Cobol or PL/1 IBM 360/50 Ass or Cobol
SUSSEX	IBM 370/145 PL/1 or Cobol IBM 370/138 Ass or Cobol
WILTS.	IBM 370/145 Cobol ICL 1900 Cobol
YORKS.	ICL 1900 Cobol or Plan Honeywell Cobol

SYSTEMS ANALYSTS

£5k-£6.5k

LONDON	Mini Systems Cobol, Fortran Ass. (W.C.2)
HERTS.	ICL 1900 Cobol IBM 370 Cobol
KENT	Honeywell Cobol

ANALYST PROGRAMMERS

£4k-£5.7k

LONDON	Mini Systems Cobol, Fortran Ass. (W.C.2)
HERTS.	ICL 1900 Cobol
KENT	ICL 1900 Cobol
MIDDX.	IBM Sys. 3 RPG II
YORKS.	ICL 1900 Cobol or Plan IBM 370/148 Cobol

CONTRACT & FREELANCE

IF YOU ARE COMMITTED FOR ANY PERIOD OF TIME AHEAD, RING US WITH YOUR AVAILABILITY DATE AND WE WILL ENSURE THAT YOU ARE CONTACTED IN ADVANCE OF THE END OF YOUR PROJECT TO MAINTAIN WORK CONTINUITY. PROJECTS IN U.K. AND HOLLAND. TEL: PETER QUIN or JAMES BARKER on AMERSHAM (02403) 22201 or 01-437 3063.

H.P.S.L. H.P.S.L. H.P.S.L. H.P.S.L.

GRAMPIAN HEALTH BOARD
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SENIOR PROGRAMMER/ANALYST

A Senior Programmer/Analyst, with experience of COBOL and financial computing, is required to work on systems utilising an ICL 2904 disc and tape configuration. A knowledge of PLAN and ICL hardware would also be an advantage.

The salary is £4038 per annum, rising by annual increments to £4864 per annum, inclusive of earnings supplements under the Government's current pay policy.

There are four weeks' annual leave, plus nine days' public and statutory holidays. There is a contributory Superannuation Scheme.

The Computer Centre is situated in a modern purpose-built building with excellent facilities.

Application forms and further particulars are available from the:

Area Personnel Officer,
Grampian Health Board,
1 Albyn Place,
ABERDEEN

to whom completed applications should be returned by Friday, 30th September, 1977.

Senior Operations Opportunities

Shift Managers:
£5,600-£6,200
Senior Operators:
£4,600-£5,000

As a national leader in the competitive multiple retail trades, Tesco must move with the times. We have always been an innovative Company. We were one of the first V.D.U. users in the country.

Currently hardware installed at our Cheshunt Head Office includes three ICL 1904 S 96K computers, 24 EDS 60's, 80 V.D.U's full teleprocessing facilities. With major hardware investment coming up in the very near future we are seeking experienced senior staff to strengthen our existing operating team.

We require:

SHIFT MANAGER

At least five years' experience in a senior position in ICL 1900 equipment and extensive supervisory experience within a large multi-machine installation.

SENIOR OPERATORS

A minimum of three years' experience of ICL 1900 George II installations. Supervisory and multi-machine experience are preferable.

These vacancies will involve working a rotating shift system and will be based at Head Office in Cheshunt, Herts.

In addition to salary, Tesco can also offer a wide range of fringe benefits which include a contributory pension scheme, subsidised restaurant facilities and an excellent Country Club. Assistance with relocation costs will be given where necessary.

These are equal opportunity vacancies and applications should be made by completing and returning the coupon to Mr. S. D. Whitbourn, Personnel Officer, Tesco Stores Limited, P.O. Box 18, Delamare Road, Cheshunt, Waltham Cross, Herts. EN8 9SL.

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Please return to Mr. S. D. Whitbourn, Personnel Department, Tesco Stores Limited, Tesco House, P.O. Box No. 18, Delamare Road, Cheshunt, Waltham Cross, Herts EN8 9SL.

Checkout your future career with

TESCO

CITY OPS CONTROLLER **£4800**
A minimum of 4 years' experience on Burroughs Hardware is a requirement for this financial organisation. The successful applicant, who will be both mature and technically competent, should ideally possess some supervisory experience at a senior level. In addition to the attractive salary, the company offers a subsidised mortgage, free lunches and 4 weeks' holidays.

CITY ICL OP./S. LDR. **£3800**
Applications are invited from operators with a good George II background to join a progressive commercial organisation. A 24-hour (Mon.-Fri.) shift system is in operation with EVERY 3rd WEEK FREE. The chosen candidate will be employed initially as an operator but will be expected to progress to Shift Leader rapidly. Excellent fringe benefits include subsidised mortgage, annual bonus and 50p LVs per day.

C. LONDON IBM OPERATOR **£4000**
The international organisation has a requirement for an operator with a minimum of 12 months' DOS VS experience. The hardware consists of an IBM 370/135 running on a 2-shift system. All the usual large company benefits apply.

CITY IBM OPERATOR **£3600**
An excellent opportunity exists for an operator with approximately 12 months' DOS experience to work in a banking environment. The hardware is an IBM 370/135 under DOS GRASP operating on a 24-hour (Mon.-Fri.) shift system. Gargerous fringe benefits include subsidised mortgage and 50p LVs per day.

OPERATIONS — VARIOUS

S. LDR	ICL 1900	4 yrs	Geo II	CITY	£4000+
OPs 4	ICL 1900	12 mths	Any ICL	LDN/Berks	£3800
OP	IBM 370	18 mths	OS VS	LDN/MX	£4000
S. LDR.	IBM 370	18 mths	DOS	E. LDN	£4000
SEN. OP.	IBM 370	12 mths	DOS VS	ESSEX	£3800
SEN OP	IBM 370	18 mths	OS VS1	HERTS/MX	£3800
OP	83700	18 mths	MCPV	CITY	£3750
OP	11200	18 mths	MOD 1	MIDDX	£3800+
OP	U8080	18 mths	OS	W. LDN	£3800

'DAYS-ONLY' POSITIONS

OP	IBM 370	9 mths	DOS VS	CITY	£3800
D/Ctrl	ICL 1900	18 mths	Geo II	ESSEX	£3800

A City company requires an experienced Key Punch Operator, whose duties will include some involvement within data control. Definite progression to Computer Operating. £3000.

COMPUTER TWO THOUSAND
01-637 3855
217/219 TOTTENHAM CT. RD. W1P 9AF

HUMBERSIDE COUNTY COUNCIL
Management Services Department

Computer Supervisor

£3,800 per annum approximately

Salary scale (T3): £2922-£3282 + 14% shift pay + £312 supplement + 5% of total earnings (minimum £130.32, maximum £208.56 per annum).

To work at Prospect House, Hull, and be responsible for the running of the Computer room for the duration of the shift. Experience of Honeywell level 66 equipment essential and previous supervisory experience preferred.

Assistance towards disturbance expenses up to a maximum of £400 and reimbursement of 100% removal expenses may be available under the Council's scheme.

Application forms and further details available from: Chief Computer Officer, Prospect House, Hull. Tel. (0482) 223151, Ext. 394.

Closing date: 28th September, 1977.

TEESSIDE POLYTECHNIC
Computer Centre

Vacancies exist for

COMPUTER OPERATORS

within the Polytechnic Computer Centre. The Polytechnic plans to install a large modern computer providing interactive computing for terminals throughout the Polytechnic. Applicants should have previous operating experience, and be prepared to work on a two shift basis.

Salary: Technician T1/2 - £1,215 - £3,663 + £312 + 5%.

Application forms and further particulars are available from The Assistant Secretary (Academic), Teesside Polytechnic, Borough Road, Middlesbrough, Cleveland, TS1 3BA, and are returnable within ten days.

QRH COMPUTER RECRUITMENT

B700 EXPERIENCE TO £10,000
Anal/Programmer with min 3 yrs. B700 for Tehran. 12 month contract with option for further 2 yrs. customer support function

CONTRACT PROGRAMMERS (4) TO £150 P.W.
ANSI Cobol and DLI/CICS. 9 month contract.

LEEDS
Programmers £4,000+ IBM Cobol, ANSI Cobol. Changing Hardware.

LEEDS
Analyst/Programmer to £6,000 High user contact, all commercial applications, mini computers.

WEST YORKSHIRE
Analyst/Programmer to £4,600. basic plus, lot of travel, must have good personality

LEEDS
Analyst/Programmer to £4,600, pref. with Cobol and communications experience, well dealt with senior management

WEST YORKSHIRE
Programmer to £4,600 Honeywell level 66. IDS/IDS experience required, mortlum sized installation.

PROGRAMMERS AND ANALYSTS
to £5.5K. Exp of Coral 66, Cobol, ICL 2900's or Fortans and willing to relocate to South Cheshire. Rapidly developing installation

QUEENS ROAD MILLS, HALIFAX
WEST YORKS HX1 4LR
HALIFAX (0422) 58231 (10 lines)

Data Processing Manager

Dubai **c. £15,000 tax free**

A well established company based in Dubai and supplying services to the Gulf oil fields requires a data processing manager.

The company operates an NCR 8200 128K with discs. It wishes to update its existing procedures and to extend the range of work carried out on the computer.

Suitable candidates will have experience of managing similar installations and be able to promote the use of data processing facilities within a company.

Attractive terms include free housing and utilities and generous cost of living and car allowances.

Write in confidence, quoting reference 1376/C, to E. M. Nell,

Peat, Marwick, Mitchell & Co.,
Management Consultants,
11 Ironmonger Lane,
London, EC2V 8AX.

Tubes Division
Computer Professionals
Corby, Northants

THE PROJECTS
- Major system development programme with both batch and on-line systems.
- Conversion of Corby installation from OS/MFT to OS/VS1 and systems support of enhanced installation.

THE EQUIPMENT
- IBM 370/155 installation which is about to be enhanced with a 370/148 in duplex mode on site at Corby.
- Access to Corporation's Bureaux computers over sophisticated private network.

THE PEOPLE
- SYSTEMS ANALYSTS (2 years experience)
- PROGRAMMERS (2 years experience, IBM COBOL-OS/VS1)
- SYSTEMS PROGRAMMER (3 years experience, OS/VS1)

THE ATTRACTIONS
- Challenging work
- Comprehensive management development scheme
- Good career opportunities within the Corporation
- Well defined salary structure
- Good contributory superannuation scheme
- Help with relocation expenses possible.
- Attractive area with wide choice of reasonably priced accommodation to rent or buy. Northampton and Leicester nearby. Ready access to London by road and rail.

FOR MORE INFORMATION
Telephone Philip Bouch CORBY (05536) 4241, ext. 216

FOR APPLICATION FORMS
Telephone or write to:
Manager, Staff Recruitment,
BRITISH STEEL CORPORATION,
Tubes Division, Corby,
Northants NN17 1UA.
Corby (05536) 2121 Ext. 128 or 160

CHIEF PROGRAMMER DESIGNATE

FOR AN INTERNATIONAL WHOLESALE AND DISTRIBUTION COMPANY

CENTRAL LONDON **Salary: c £5000 pa**

Our client is at a very positive stage of development.

They are in the early phases of expanding their existing data processing facilities, which will result in a country wide communications network.

At present, their hardware consists of an IBM mainframe at their Head Office in Central London, and stand-alone mini computers at two remote locations.

Their aim is to have full communication facilities through a series of approximately 25 mini computers at their major market areas.

A vacancy has now arisen for a Senior Programmer with sound technical and team leadership skills, to play a key role in the successful implementation of this development.

In order to meet their requirements you must have at least 3 years' BAL/COBOL experience obtained in an IBM DOS environment, with equal strength in both commercial applications and system software.

By proving your ability in these areas, short term rewards will be promotion to full Chief Programmer status with the associated responsibilities.

Please contact Marilyn Black quoting reference no 770.

Computing Services Association

WE ARE ALWAYS INTERESTED IN HELPING *YOU* WITH YOUR CAREER
John Goldsmith (Computer Recruitment) Ltd., 15, Buckingham Palace Road, London, S.W.1.
Tel: 01-828 5356-24 hour answerphone service.

JOHN GOLDSMITH (Computer Recruitment) Ltd.

UCSL ANGLIA DATA SERVICES LTD., YORK

SENIOR PROGRAMMERS PROGRAMMERS

Unisys Computer Services Ltd. is one of the largest computer service bureaux in the UK. Anglia Data Services, a member of the group, has centres in York, Norwich, Bradford and Leicester and provides a wide range of d.p. services to clients throughout the U.K.

We use IBM 370/158 and 145 computers in York where these positions, open to both men and women, are based. In addition we have Data 100 terminal facilities to other centres within the group.

Applicants should have a minimum of three years' programming experience. A good working knowledge of Cobol is required and any experience of PL/1 or Assembler is useful but not essential. Familiarity with an OS or VS environment would be an advantage.

We are looking for both senior and junior people and attractive salaries will be offered, commensurate with experience, together with pension fund and other fringe benefits. We offer interesting and varied work and there are good career progression opportunities for well motivated staff with ability. York is a beautiful city with easy access to the countryside and coast, and minimal commuting problems.

To apply, please write in confidence to Norman Lord, Bureau Manager, Anglia Data Services (UK) Ltd., Wiggington Road, York YO1 1XY, or Phone York (0904) 20911.

OPERATIONS SUPPORT

Centre-file is one of the leading Computer Bureaux in the country currently providing services to some 2,500 industrial and commercial organisations.

Due to expansion of our 'on-line' Batch and Custom Built Services we require a number of additional staff to assist in the day to day running of our services which are run on our three IBM 370/155 machines.

We are looking for mature and responsible people, experienced shift leaders or operators would be ideally suited, with sound knowledge of IBM OS, JCL and utilities.

Salaries, within the range £3100-£5320, will depend on experience and in addition the Company offers an attractive range of fringe benefits.

Applications should be addressed to Mike Atkinson, Personnel Officer, Centre-file Limited, Boundary House, 18-22 Furnival Street, London EC4A 1JU.

Senior Programmer to £5,500
CITY
A profitable Service Bureau of long standing has need of a D.E.C. programmer with on-line and PDP RSTS experience using BASIC. Here is an opportunity to grow with a growing firm
CW 37/11 Michael

Programmers £5,000
ENFIELD/BIRMINGHAM
Five COBOL programmers, preferably with large machine experience, are urgently required by this medium sized with-it service bureaux having H66 equipment for both their Enfield and Birmingham offices. Flexitime, subsidised canteen and 4 weeks hols.
CW 37/9 Annette

Programmer Analyst £5,500
W. MIDDX
An IBM COBOL programmer (OS or DOS) is required urgently by this Consultancy using an IBM 370/158 computer. Major applications include stock control, bought ledger and manufacturing systems using a linked System 32 computer.
CW 37/10 Annette

Programmers & Snr Prog to £5,000
NR. HARLOW
An ICL oriented manufacturing organisation with a substantial installation requires COBOL people. They are quite happy to retrain non-ICL COBOL programmers. So if you like this area of the country and enjoy a challenge — apply now.
CW 37/8 Annette

Senior Systems Analyst c£6,500
NR. STAINES
If you have ICL financial and commercial systems experience and like to be in charge, then this position could be for you. The firm is part of a large manufacturing group with a secure future
CW 37/16 Annette

Systems Programmer £6,500
CITY
A major user of PDP 11 equipment requires ASSEMBLER programmers who have operating systems experience. Real time systems of an international nature are yet to be installed. 4 weeks hols and other good perks.
CW 37/13 Michael

Systems Analyst and Analyst Programmers £5,000-£7,500
S.W. LONDON
An international insurance company with major expansion projects under way is looking for staff at all levels. The senior applicants must have insurance experience and the programming staff must know IBM COBOL DOS/VS. Free life assurance, 3 weeks' holidays, etc. A really exciting opportunity for the right people.
CW 37/14 Annette

Systems Analyst to £6,500
S.W. LONDON
A major food group situated in S.W. London is engaged on a new expansion of its computer systems department. Commercial analysts (preferably with on-line experience) are requested to apply for this really exciting position. Excellent prospects.
CW 37/15 Annette

Programmer £5,000 to £6,500
W. LONDON
A famous International Petro-Chemical organisation using a Univac 1108 requires commercial programmer with COBOL, EXEC 8 experience. Excellent large company perks, long hols, and very good promotional prospects.
CW 37/12 Annette

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CHISWICK W4 3BR
Recruitment Consultants
01-995 3883 or 01-958 6138 evenings

COMPUTER OPERATIONS MANAGER

FMC Computer Centre has a vacancy for an Operations Manager.

An ICL 1903A with EDS 60's, Mag Tapes, fast printer and communications facilities is used to provide a central computing service to the FMC Group of Companies, the largest group of meat manufacturing and wholesaling companies in Europe.

The ideal candidate will have:-

(a) The ability to control and direct operations staff.
(b) The ability to communicate effectively at all levels and maintain complex operating schedules.
(c) An in-depth knowledge of George II.
(d) Experience of communications and on-line operations.
(e) Programming knowledge.

A 2½ shift system is in operation.

Salary is negotiable around £4,500 and assistance will be given with removal expenses.

Applications in writing please, giving details of experience to date and qualifications, to:
J. S. Sanders, Group Data Processing Manager, FMC (Meat) Ltd., Computer Centre, P.O. Box 1, Calne, Wiltshire, SN11 0JL.

OPERATORS UK & EUROPE

The operation division of Marcol Computer Services Limited is expanding rapidly and to support this growth we need to recruit a number of experienced operators either on a permanent or contract basis.

If you have 2½ years' experience or more on any mainframe and are interested in joining a go-ahead company contact

Pat Eagling, 01-402 9366

MARCOL COMPUTERS SERVICES LIMITED
60 QUEENS GARDENS
LONDON W2

MARCOL is an associate company of the Norwich Union

Engineering Software Production

New opportunities at Newcastle-under-Lyme and Bracknell

Customer Engineering Division in ICL is creating a new team of experienced software producers in New Products Engineering.

We need management and programming men and women with experience in the production of effective software to tight timescales. You will provide our customer engineers with software tools to improve the cost-effectiveness of our maintenance services.

You should preferably have a 1900 software background and be:

- Self-motivated and results-oriented.
- Able to take responsibility for all aspects of program production from formulation of a specification through design, coding, testing and documentation.
- Articulate and able to communicate with engineers as well as software staff.
- Keen to establish a personal reputation for meeting time and quality targets for software production.

ICL is British-owned and Europe's leading computer manufacturer successfully marketing a range of systems in over 70 territories worldwide. The Company sells systems to Industry, Commerce, Research Establishments, Universities and Governments.

Specifically we have the following opportunities in Engineering Software Production:

Production Manager
Newcastle-under-Lyme **£5500–£7000**
We require a manager to lead the programming teams in meeting their time and quality targets. These teams will often be working at remote sites and during unsocial hours.
Technical competence is a pre-requisite, and the ability to motivate highly skilled staff in a challenging environment is essential. (Ref CW1514A).

Planning and Control Manager
Newcastle-under-Lyme **£5500–£7000**
You will plan the unit's committed activities and appraise future requirements. Your task will be to ensure provision of all supporting services including machine time, transportation and accommodation. (Ref CW1514B).

Analysts/Programmers
Newcastle-under-Lyme & Bracknell **£4000–£6000**
Small teams will work on each major application. They will produce an overall system design, then detailed program specifications. The programs will be written, tested and documented by the team, ready for validation and issue to the field.
In addition to experience of software development using PLAN under Operators Executive and George operating systems, some experience of 1900 Executive mode working would be useful (Ref CW1514C).

Assistance with relocation expenses can be given where appropriate. For further details telephone Ray Sayers on Newcastle-under-Lyme (0782) 610131. Alternatively write for an application form to A E Turner, International Computers Ltd, 85/91 Upper Richmond Road, Putney, London SW15, quoting appropriate reference.

International Computers ICL
think computers-think ICL

GET YOUR C.I.C.S. AT MARCOL

Marcol is a name you know well. We are a growing organisation which has earned a high reputation as one of the leading computer service companies not only in this country but throughout Europe as well. At the moment we are involved in a number of long term projects using C.I.C.S.

So if you are interested in learning C.I.C.S. and from one of the top international computer houses, if you have at least 2 years IBM Cobol experience and a desire to get on fast, then give us a ring.

Starting salary of £5,000 and there are real opportunities for overseas assignments.

Contact: Derek Ashley, 01-402 9355 Marcol Computer Services, 60 Queens Gardens, London W2

Computers Cill

MARCOL
Dynamic Systems for tomorrow's needs
An associate of The Norwich Union Group. NORWICH UNION

contract programmers

IBM COBOL OS/DOS **LONDON OR HERTS £200+ p.w.**
We have immediate requirements for a number of programmers with IBM OS COBOL skills, to undertake medium term contracts in London
We also require programmers with IBM DOS COBOL, who also have a knowledge of BAL, who are prepared to work in South Herts.

RPG II **SUSSEX £200+ expenses**
We have a requirement for skilled RPG II programmers who would like an interesting and challenging opportunity and who would be prepared to work on the Sussex Coast

RPG II/DOS COBOL **BELGIUM £250+ everything**
We are currently looking for a number of programmers who have a minimum of 3 years' experience who are self-motivated and good communicators, to undertake medium term contracts in Belgium

MINI ASSEMBLER OR IBM BAL
BELGIUM £250+ everything
This is an opportunity for programmers with any Mini Assembler language or IBM BAL, who have had at least 3 years' experience It would also be an advantage if applicants had a knowledge of Telephone Systems

We can't say any more than that — except what you have to be to get them Male or Female, preferably 24 or over with a minimum of three years' indepth experience of the required skills.

Ring Roger Slade on 637 9696 during the day or leave brief details and a call back number for us on our diabolical machine

22 Newman Street, London W1P 3HB. Tel: 01-637 9696/7
Computer Consultants London Hamburg
eUroco

FREELANCE VACS

	M/C	SYSTEM	START	LENGTH	AREA
4 Ops	1900	G3	Now	3 mths	N England
Technical Support	1900	G3	Now	Indef	N England
5 Ops	1900	G2+	October	3 mths+	London
1 Op	1900	G2	Now	1 wk+	Midlands
1 Op	2900	VMEK	Now	Indef	Various
1 Op	System 3/6		October	1 mth	Middx
O/C Clerk	1900		October	3 mths+	London
O/C Clerks	System 4		October	3 mths	London
1 Op	1900	G3	October	6 mths+	Berks
Punch Ops	Any		Sept 26	2 mths	London
1 Prog	COBOL	DOS	Now	12 mths	N London
1 Prog	Cobol+BAL	DOS	Now	9 mths+	N London
8 Ops	2900	VMES	Now	Indef	N England
1 Op	Honeywell	OS 2000	Sept 19	Indef	London

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EG Licence No. SE(A)52

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Personnel Consultants 01-439 6481
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SHIFT LEADER £5000
This senior position requires a person with OS MVT experience plus some DOS knowledge London Ref 193

SHIFT LEADER to £5000
A Middlesex company is looking for a mature knowledgable individual around 28 years old, with OSVS1 for their 370/148 Ref 192

SHIFT LEADER £4300+
City banking group with 370/135 needs an excellent DOS/VS person, experience 4 years + All usual banking benefits A Senior Operator also required. Ref 90

SHIFT LEADER £4600+
Central London organisation require communicative senior person with 3 years' experience and very good OSVS1 knowledge 370/138 installation, excellent benefits Ref 132

SENIOR OPERATOR £3600+
Essex company wants experienced DOS/VS operator for a two shift 370/135 Ref. 191

RPGII PROGRAMMER to £5000
Young West London company with System 3/15 require an experienced RPG Programmer with some Cobol knowledge. Similar vacancy also in South London Ref 175 & 136

COBOL PROGRAMMER/ANALYST £5500
A programmer with 2-3 years' Cobol required for 370/135. DOS/VS installation in Central London Some analysis experience would help. Ref 194.

To discuss these or our unadvertised appointments in more detail and in the strictest confidence, call X-Calibur on 01-353 8201/3 or write to 47 Essex Street. London WC2E 3JF

Computing Services Association Licence No. BE(A) 2467

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Five Senior Programme Designers	5-6.5K(TW125C)
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01-930 4163

RTZCS

Islington Finance

SHIFT LEADER

AP4 (£4759-£5137 p.a. inclusive of 12½% shift allowance)

To take responsibility for the day to day running of the 1903T under George 3 for 2 shifts. Applicants should have a minimum of 2 years' operating experience and an in-depth knowledge of George 3.

The Borough shortly expects to place an order for a new range machine to control the expanding telecomms systems For further details and application form contact Mr. Carter on 01-226 1234 Ext 216 or 218 or write to Director of Finance, Town Hall, Upper Street, London. N1 2UD, quoting reference F126. Closing date 30th September, 1977

Computer Operators

are required for Harwell's IBM 370/168 computer which provides a service to several hundred scientists both on site and via remote terminals. Previous experience of computer operating is desirable but training will be given to suitable candidates without operating experience. Applicants may be male or female but must be over 18 years of age. Availability for shift working is essential.

Pay for suitably experienced operators will be on the scale £2,225 to £2,875 per annum, and for operators without suitable experience, on the scale £32.85 to £39.95 per week. Pay supplements at £313.20 per annum (£6.00 per week) and 5% of earnings, subject to a minimum of £130.50 per annum (£2.50 per week) and a maximum of £208.80 per annum (£4.00 per week), are payable in addition, together with an allowance of up to 17½% of basic salary for shift working.

Further information is available from:

Appointments Section 'B', AERE, Harwell, Didcot, Oxon, OX11 0RA. Tel: Abingdon 24141. Ext. 2059.

HARWELL

ANALYSTS — PROGRAMMERS — OPERATORS
BRISTOL — GLOUCESTERSHIRE — WILTS.

Our clients are seeking experienced and well qualified staff to join their West Country based organisations.

ANALYSTS are required for static locations and mobile positions calling for experience with mini equipment, and client liaison. Salary will be to £5000 + car allowance, depending on post.

PROGRAMMERS need to have a minimum of three years' experience of Cobol and preferably Plan ideally on ICL equipment. Salary to £4500.

OPERATORS should have worked on IBM 370s under DOS/VS, VM and can expect a salary of c. £4500.

TECHNICAL SALES SUPPORT personnel are also required, with experience of ICL software. Salary to £5000.

For further details please contact:
RICHARD COVE
ATA SELECTION
Tel: 0272 211035

ata

LEICESTER CITY COUNCIL

PERSONNEL & MANAGEMENT SERVICES DEPARTMENT
COMPUTER DIVISION

We are beginning several new developments and applications are invited for the following posts in mixed systems/programming teams.
Salaries stated below include Stages 1 and 2 supplements.

A. TEAM LEADERS
£5209-£5770
High calibre staff required. Must have an extensive depth experience of initiating, developing and implementing commercial systems and proven experience of successful project management.
One post (Special and Technical Support) includes supervision of the Senior Programmer (Software) and assignments on investigation of techniques, standards and training.

B. SYSTEMS ANALYST
£3861-£5065
Applicants should have good commercial experience and be able to apply professional skills to the analysis of business problems, with the potential to develop into a Senior role.

C. LEAD PROGRAMMER
£3861-£4615

PROGRAMMER
£2983-£3773

As well as the ability to write and test COBOL programs, a minimum one year's proven experience. To be considered for the higher graded post, applicants should be offering at least 3 years' experience including supervisory duties of program production; experience of BAL, CICS/VS, VANDL/1 (or DL/1) and writing of program specifications will be an added advantage.

The City Council operates on IBM 370/135 under DOS/VS and CICS/VS in newly constructed office accommodation with excellent working conditions and a staff restaurant. A system of Flexible Working Hours is also in operation.

Aids to relocation expenses available in approved cases.

For further details and an application form, write to the Director of Personnel and Management Services, New Walk Centre, Welford Place, Leicester LE1 6ZG or telephone Leicester (0533) 549922, ext. 7084.

Closing date for applications 28th September, 1977

OXFORD POLYTECHNIC
Computer Centre

Chief Programmer

(Salary in the range of £4239 to £4545 plus £312 and Phase 2 supplement).

An experienced programmer is required to take charge of the Polytechnic team of three programmers. Applicants should hold a degree or equivalent, and have good experience of GEORGE II and MAXIMOP. The Polytechnic has an ICL 1903T which is currently being enhanced.

Further particulars and application forms from:

The Administrator Oxford Polytechnic Oxford OX3 0BP

WEST YORKSHIRE PASSENGER TRANSPORT EXECUTIVE
require an

ANALYST PROGRAMMER

(Ref. PHF 11/5)

£3770-£4240 + 5% Supplement (max. £4 per week)

The Executive is a user of the West Yorkshire Joint Computer Committee's IBM 370/158 with 3330 disks and operating under OS/VS1.

Processing of the Executive's systems is from several remote job entry terminals, and interactive terminals are used for program development. Extensive systems development and systems redesign of both commercial and transport based systems are planned.

Applications are invited from persons with a minimum of two years' programming experience, principally in COBOL and a working knowledge of system design and implementation.

The Executive offer the following benefits — concessionary travel, canteen facilities, a good pension scheme and modern working conditions. Additionally a staff bus operates between Leeds and Wakefield.

Application forms are available from the Personnel Section, W.Y.P.T.E., Metro House, West Parade, Wakefield (Tel. 0924-78234 Ext. 284) to be returned no later than 28th September, 1977.

Metro

IBM Op
C London c£4500

ICL S/Ldr
Surrey £3800

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CONTRACT EUROPE

- High Income contracts through joint R.T.Z. Computer Services/Inforama — the Paris based European systems house.
- Graduates and experienced personnel required with knowledge of scientific or financial systems, interactive or database technology.
- Languages: COBOL, PL/I, FORTRAN, BASIC or Assembler level.
- Mini or mainframe experience required.
- Contracts for Operators, Programmers and Analysts in France, Germany, Holland, Italy, Spain, Switzerland, and United Kingdom.

R.T.Z. Computer Services Limited,
103 Jermyn Street, London, SW1Y 6EB.

RTZCS 01-930 4163

TEESSIDE POLYTECHNIC
COMPUTER CENTRE

PROGRAMMER ANALYSTS
(4 POSTS) T1/5

Applications are invited for the above posts.

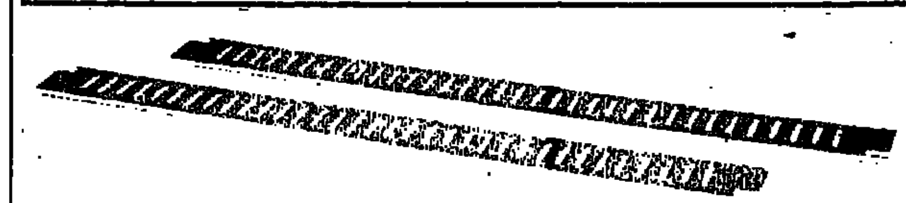
The Computer Centre provides a service to the whole Polytechnic, and is planning to install a large modern computer in the next year. A wide range of programming is undertaken, including systems programming and the development of applications software for the academic departments, the Library and the Administration.

Programmer Analysts should normally be graduates or equivalent educational standard and preferably have two years' programming experience.

The starting salary will be at an appropriate point on the scale T1/5 £1,608-£4,515 (includes supplements) — minimum starting salary at age 21 — £2,362. A progressive career structure operates within the scale. For graduates the minimum scale will be T2 £2,983-£3,323.

Application forms and further particulars may be obtained from the Assistant Secretary (Academic), Teesside Polytechnic, Borough Road, Middlesbrough, Cleveland, TS1 3BA, to whom they should be returned as soon as possible.

PRODUCT NOTES



AN extension to its range of aluminium front panels for electronic instrument racks and cases has been announced by Langley Metal Products. Incorporating rows of ventilation slots, the new panels are designed to allow heat generated by electronic equipment to dissipate. Samples are illustrated above.

Available in four sizes, the panels are designated LFPV1 to LFPV4. They are manufactured from 10 swg aluminium and can be supplied either "clean" or in a choice of three finishes, namely PVC-coated on one side, gloss stove-enamelled, or anodised on one side.

They are all 19 inches wide and the height varies from one and twenty-three thirty-seconds of an inch to six and thirty-one thirty-seconds of an inch. A discount for quantity orders is also available.

Langley Metal Products Ltd (CW), Unit 4A, Lyon Industrial Estate, Hartspring Lane, Watford WD2 8JU. Tel Watford (92) 48327.

Remotely controlled broadcasting units

A RANGE of remote controlled units for the broadcasting of pre-recorded messages has been introduced by L.G.M. Electronics. The range consists of three units with four, eight or 16 channels and the units are available for mounting on 19 inch racks or in a cabinet.

The channels are selected by push buttons mounted on the front panel while the channel in use is indicated by an illuminated LED lamp.

The operation of the selected button causes momentary application of an earth to the connected line, automatically causing the required channel to be selected and played. The audio output is 0.775 volts into 600 ohms, balanced or unbalanced.

Power supply of 200 to 250 volts is required at 50 Hertz. Integrated circuit electronics are used throughout and the unit is supplied complete with a cartridge and a microphone for recording purposes.

The units can be used in conjunction with any normal broadcasting system as well for communicating repetitive information in supermarkets, stores, offices, factories, railway stations, etc; or for transmitting emergency instructions in areas where people congregate.

L.G.M. Electronics Ltd (CW), 22 Station Approach, Fleet, Aldershot, GU13 8QY. Tel: Fleet (025 14) 28018.

Copyholder for A3, A4

A COPYHOLDER designed to hold either A4 or A3 sheets is now available from Facit Addo and is designated the Facit Liner.

The A4 model is designated FL10 while the A3 model is FL165. For both types movement of the cursor is by means of an electric motor controlled by a foot-operated micro switch which provides constant speed and instant start and stop.

The standard cursor is of smoked plastic, giving clear indication of position while permitting the copy beneath to be read if required. In the case of the A4 model, a clear magnifying cursor can be supplied as an option.

The Facit-Liner is intended for keyboard copying operations. It leaves both hands free and is claimed to reduce fatigue by presenting copy at the right angle for viewing and by reducing operator movement.

In standard form the Facit Liner is supplied with base plate and short mounting column to sit simply on a desk beside the keyboard unit. It can, however, be supplied with several alternative fixings if the standard model is unsuitable.

Price of the A4 model in standard form is £69.50 while the A3 model costs £79.50. In both cases VAT is extra.

Facit-Addo Ltd (CW), 21 West Street, Dunstable, Bedfordshire. Tel: 0582 601101.

Terminal

CHAT — CHeap Access Terminal — is the name of a low cost KSR unit to be marketed in the UK by Tradecom International.

Built by Computer Engineering Ltd of Hitchin (CEL), Chat uses a standard CCITT V24 serial interface and operates at two speeds, switchable between 110 and 300 baud.

Its 80 column printing on electrosensitive paper is virtually silent. It weighs 20 lb and its modular design is said to simplify maintenance.

Two versions are available. The "read only" version costs £650 while the KSR model is £750. For quantities of 50 the prices are £450 and £550 respectively. The ASCII character set is supplied but non-standard keyboards and special interfaces are available to order.

Tradecom International, Suite 51, Beatty House, Dolphin Square, London, SW1V 3PH. Tel: 01-828 4413.

Tape storage

AN open storage system for magnetic tapes has been introduced by Flambo-Fortschritt. Called the BTH, the system consists of linked modules made of steel with slotted uprights and 900 mm cross beams.

The system is available in three heights, and shelf spacings can be set at either 270 or 320 mm allowing up to eight rows of tapes to be stored in the biggest module.

The BTH system is sold in complete units with removable ends, thus allowing the user to build complete tape filing stations as demand requires.

Flambo-Fortschritt Ltd (CW), 71 Lots Road, London SW10. Tel: 01-351 4242.

Paper tape reader/punch

INTRODUCING a paper tape reader/punch is Anderson Jacobson. Named the AJ430, it provides input and output for 300 baud teleprinters and VDU terminals.

The addition of this unit to the AJ range allows the company to offer ASR with paper tape as well as cassettes and when connected to ASR terminals, the resulting system is functionally equivalent to the widely-used ASR33.

The AJ430 may be used off-line to prepare, edit and duplicate tapes. Online, the unit may be operated as a stand-alone tape terminal or, in conjunction with other terminals, in full or half duplex modes.

Typical applications include time sharing, computer input and output, program storage, data logging, numerical machine control and unattended terminal applications.

Concessionary prices are offered to companies already using AJ terminals, or when the unit is purchased as part of a total AJ system.

In operation the AJ430 emits noise between 54 and 60 decibels. It has a hardened steel die block capable of cutting all types of tape whether paper, oiled, unoiled, rolled, folded, Mylar and Mylar laminates. The die block is designed to cut up to 1,000,000 feet of oiled buff tape.

Anderson Jacobson Ltd (CW), Estate Office, Station Approach, Shepperton, Middlesex. Tel: 01-984 4439.

Auto franking

TWO franking machines with automatic letter feeds and sealing units have been introduced by Hasler for speeding up the preparation of mail leaving the office.

The F88 can frank 6,000 letters per hour and handles letters up to 10 mm thick. The F66 can handle up to 3,600 letters an hour. Both machines use value cards, which means that the machines do not have to be taken to the Post Office to be credited. Value cards ranging from £100 to £1,000 are available.

Hasler (Great Britain) Ltd (CW), Commerce Way, Croydon CR0 4XA. Tel: 01-686 0901.

Puzzle answer

THE sum involved is $41,212^2 = 1,698,428,944$. To solve the problem, the kind of reasoning required is "The first x in the top line must be at least 4 to give two figures in the third line and no more than 4 to give only two figures in the fifth line", and so on.